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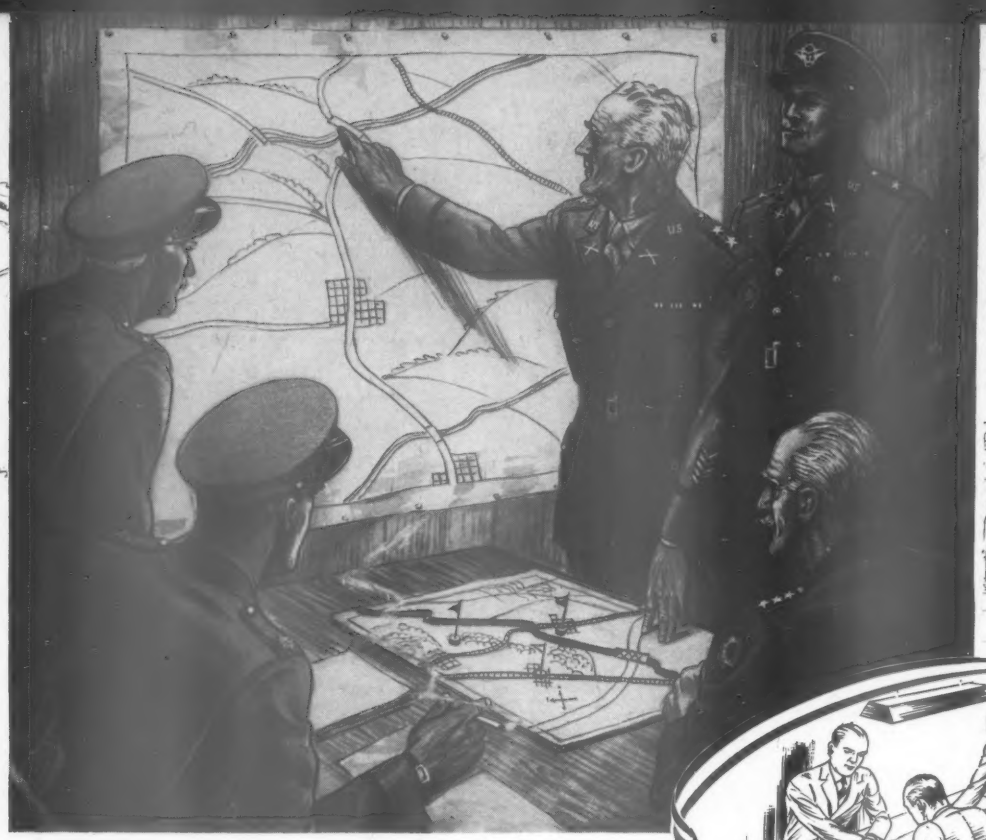
APRIL 8, 1943



From today's research and planning will come the EMCO Meters and Regulators of tomorrow

Generals Plan Tomorrow's Battle While Winning Today's

ON the far-flung battle fronts of the World, brave United States Soldiers, Sailors and Marines are being directed by military strategists in waging the most scientific war ever fought. This is a war of men and machines. Weighted in our favor is the fact that our machines are products of the same industrial ingenuity that has made America the greatest nation of them all—the men who use them are those who, both by heritage and training, will provide the skilled hands to guide the way to ultimate victory.

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the OIL AND GAS JOURNAL

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General Heading: BAKER CEMENT WASH-DOWN WHIRLER FLOAT SHOE

Unit No. A-24

Subject: How to Secure a "First Time" Cement Job at the Critical Cementing Point....The Shoe Joint

BAKER OIL TOOLS, INC.

Main Office and Factory:
6000 So. Boyle Ave., Box 127, Vernon Station, Los Angeles, Calif.
Central Division Office and Factory:
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19 Rector Street, New York, N. Y.

Index: 250.1
Date: April 8, 1943
Page: 1

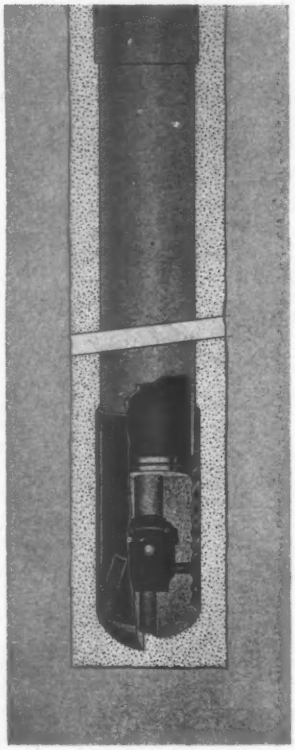
The best time to do a cement job is the FIRST TIME . . . and field results have proved conclusively that the best chance for a successful "first time" job is by using Baker Cement Wash-Down Whirler Equipment.

The hazard of channeling can be reduced to a minimum if uniform cement distribution is secured at the critical cementing point, the Shoe Joint . . . and that's the assurance you have when a Baker Cement Wash-Down Whirler Shoe (usually in combination with a Baker Cement Collar) is on your casing string.

When the fluid strikes the baffled ports in a Baker Cement Wash-Down Whirler Float Shoe or Wash-Down Whirler Guide Shoe, a downward and then an upward whirling motion results. When running in casing, this whirling action provides a means of disintegrating and washing away bridges. When cementing, the whirling motion, imparted first to the fluid preceding the cement slurry and then to the slurry itself, washes the formation and properly prepares the hole. It then assures best possible distribution of a uniform body of cement around the shoe and the shoe joint. It is this uniform cement distribution (see illustration) that reduces the hazard of channeling to a minimum and often saves a costly recementing job.

For sales, service or information concerning Baker Cement Whirler Equipment, contact your nearest Baker office or field representative.

Quick FACTS



CONCERNING THE BAKER CEMENT WASH-DOWN WHIRLER *FLOAT SHOE

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It Provides . . . .

1. Safe Guiding and Floating.
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3. Positive Acting BALL-TYPE Back-Pressure Valve.
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BAKER CEMENT GUIDING, FLOATING, CEMENTING EQUIPMENT

For complete details concerning the Baker Cement Wash-Down Whirler Float Shoe and other efficient Baker Guiding, Floating and Cementing units, see pages 226-241 of the 1942 Baker, or Composite, Catalog.

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Baker Cement Whirler Float Collar with Solid Bottom Baffle with Metal "Petal" Basket
Product No. 306

the OIL AND GAS JOURNAL

Trends

Crude-Oil Production
By States—Page 112

CRUDE PRODUCTION 3,930,255 bbl. daily average—up 18,085 bbl. One year ago 3,439,850 bbl.

CRUDE STOCKS 239,126,000 bbl. as of March 27—up 709,000 bbl. One year ago 263,208,000 bbl.

GASOLINE STOCKS 94,079,000 bbl. as of March 27—down 80,000 bbl. One year ago 107,162,000 bbl.

RESIDUAL FUEL-OIL STOCKS 67,938,000 bbl. as of March 27—down 240,000. One year ago 82,517,000.

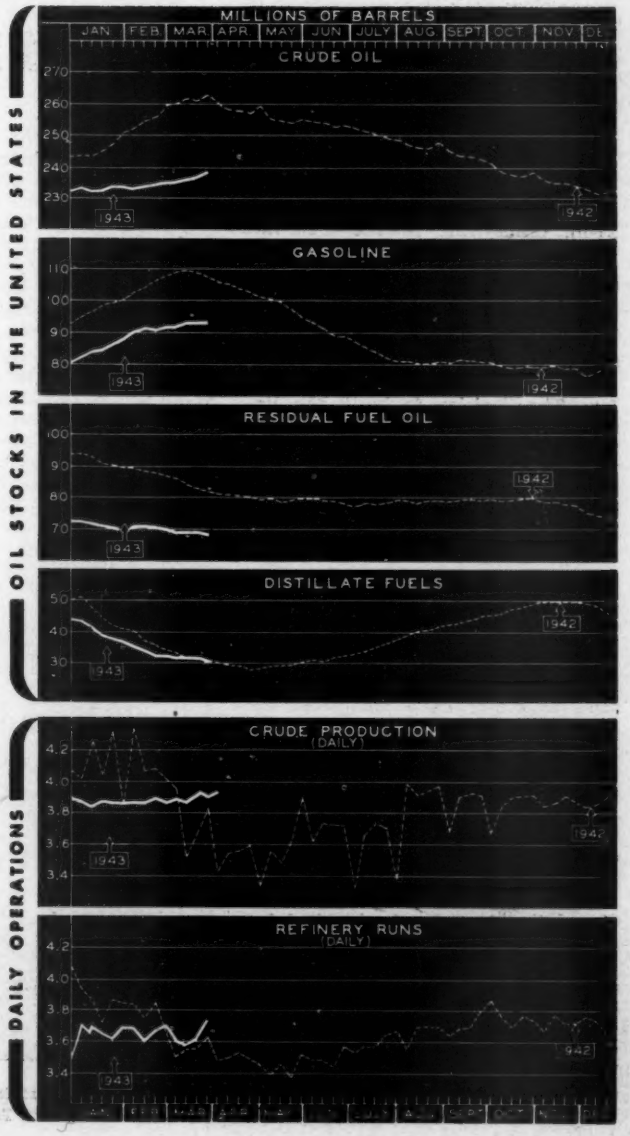
GAS OIL AND DISTILLATES 30,980,000 bbl. as of March 27—down 744,000. One year ago 30,659,000.

REFINERY RUNS 3,742,000 bbl. daily week ended March 27—up 124,000. One year ago 3,633,000 bbl.

DEVELOPMENTS of the past week again stressed the necessity of making greater quantities of the "sour" crudes of West Texas and New Mexico available to make up shortages in other crudes now in effect or in prospect in several oil-producing areas. This situation received considerable attention last week at the Wichita meeting of the Interstate Oil Compact Commission where representatives from most of the oil states, with the exception of Texas and Louisiana, reported an excess of crude demand over supply throughout the remainder of 1943. The difficulties in refining sour crudes at refineries equipped to refine sweet crudes were realized in the Wichita discussions, but this manufacturing problem, it was felt, would have to be solved.

THE situation in Texas supply can be visualized by comparing last week's production with the peak output of last year, which occurred the week ending February 7, 1942. The Texas output that week averaged 1,731,400 bbl. daily, or 338,750 bbl. daily more than the average of last week. The West Texas production during the peak week was 353,400 bbl., or 135,000 bbl. more than last week, and the Southwest Texas output during the peak week was 110,100 bbl. daily, or 42,400 bbl. daily more than last week. These data are pointed to as indicating the supplies available from West Texas and Southwest Texas not now being utilized due to restricted markets through prewar transportation channels. The reduction in markets over the past year for this sour crude is partially accounted for by the fact that Gulf Coast and East Coast refineries which could and did use the crude in the production of civilian products before the war cannot refine the same quantities at their plants which are now geared to the production of 100-octane gasoline and other war products.

THE partial answer to this problem, as explained elsewhere in this issue, is to build one or more lines north out of West Texas. One company is now proposing to build a 16-in. line with its own funds. This line, if operated at capacity, could deliver in excess of 100,000 bbl. of crude oil daily to northern Mid-Continent and middle western refineries. It is assumed that if the Government approves this or any other lines north from West Texas it will also arrange for refiners to install equipment to process the crude in the production of petroleum products for civilians.



Products Line Extension to East Coast Approved by WPB, Ending Dispute

WASHINGTON, D. C. — Extension of the 20-in. products pipe line from Indiana to the Atlantic seaboard has been approved by the requirements committee of the War Production Board.

The committee found that fabrication of the pipe can be scheduled without interference with other urgent war programs. The Petroleum Administration for War expects that this decision will permit the entire line from the Texas Gulf Coast area to the New York Harbor region to be completed and in operation about the first of next year. The line is designed to carry about 235,000 bbl. of petroleum products daily.

Work is already starting on the western end of the 20-in. line which will extend to Seymour, Ind., and from that point it will follow the right-of-way already acquired for the 24-in. crude line to the Delaware River and probably on to the Hudson River. Detailed plans for the eastern terminus have not yet been decided.

The quick approval of the extension by WPB came as a surprise, as early last week there were indications that further studies would be called for. The decision to build the line clear to the Atlantic seaboard probably will put an end to attempts of Mid-Continent refiners to block construction of the western section of the products line. The decision may also require some revision in plans of PAW for product tank-car terminals at Norris City, Ill., and at Seymour, which were drawn up before it was decided to request an eastward extension of the 20-in. line.

Construction work on the eastern leg is expected to start in June as soon as crews have completed the eastern half of the 24-in. crude line. so that work will be in progress on both ends of the products line simultaneously this summer and fall.

PAW also announced that the Defense Plant Corp. has approved a list of contractors for the Texas-Indiana section of the 20-in. and that contracts will be signed very shortly. Completion to Seymour is scheduled for September 1.

Sixteen survey parties are now staking the route of the line between Texas and its intersection with the already established right-of-way of the 24-in. WEP line now in operation between Longview, Tex., and Norris City, Ill.

Construction plans for the new 20-in. line for eastward movement of gasoline and light war products of petroleum call for simultaneous work on 10 construction spreads. One operation will involve the building of extensive feeder lines in the Houston refining area. The other nine construction "spreads" will be main-line operations, each contractor building the pipe line over an assigned section, and so scheduling his work as to permit simultaneous tie-in of all sections into a finished 836-mile tube, well in advance of September 1.

Designed to carry 235,000 bbl. of petroleum products daily, the 20-in. pipe line will, at capacity operation to Seymour, Ind., make possible a net increase in East Coast deliveries of 110,000 bbl. of petroleum products daily.

Pipe liners have already dubbed the new line the "little big inch." The initial leg between Texas and Indiana will cost an estimated $44,000,000.

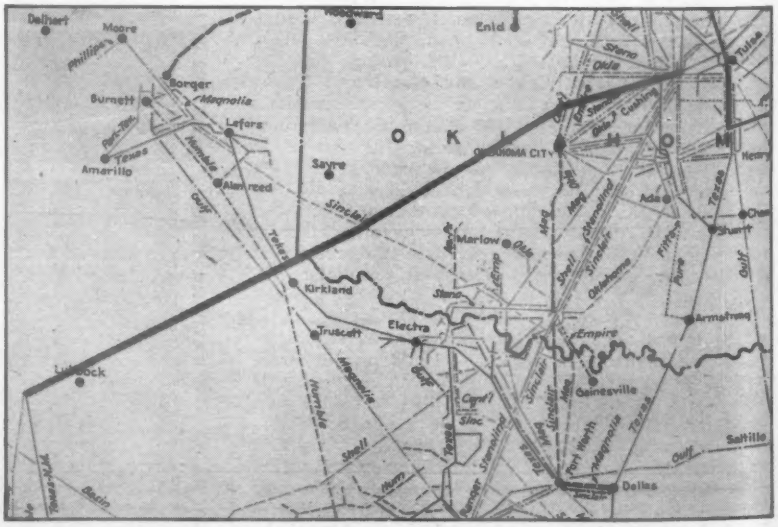
Stanolind May Build West Texas Outlet

STANOLIND PIPE LINE CO. has taken preliminary steps toward the building of a 383-mile crude-oil pipe line from the Slaughter pool, Hockley County, West Texas, to its main trunk line at Drumright, Okla. Although planning is still in the early stages the PD-200 is being submitted to PAW at Washington, D. C.

In addition to connecting with the company's trunk system, this line could connect at or near Drumright or Cushing, Okla., to Texas, Texas-Empire, Shell, Empire, Gulf, Sinclair, Oklahoma Pipe Line-Ajax, Magnolia, Standish, Mid-Continent, Tide Water, Continental and Champlin lines.

The initial capacity would be 54,000 bbl. daily which could be increased by the addition of intermediate stations up to 116,000 bbl. daily. The Stanolind engineering department has investigated a large number of designs for various pressures and pipe diameters. It appears that a 16-in. line of reasonably thin wall pipe, operated at 700 lb. is the preferable design. A capacity of 54,000 bbl. with only the one initial station at Slaughter in operation is possible because of a considerable difference in elevation which would help the flow. The line will probably cost between $7,000,000 and $8,000,000.

To answer a question which has arisen in the minds of Kansas and



Showing proposed route for the 16-in. crude-oil line of Stanolind Pipe Line Co. from the Slaughter pool, West Texas, to Drumright, Okla., and its relation to existing trunk lines

Oklahoma producers as to the effect of such a line on their market, it has been stated that the company's shippers have given definite information that they plan to continue to tender for movement through the Stanolind lines all of the Kansas and Oklahoma crude that they can possibly get, both now and as far as they can see in the future. For keeping the company's lines operating at the full 155,000 to 160,000 bbl. capacity across the Mississippi River into Illinois and Indiana, much oil is now tendered from storage in Kansas and Oklahoma. And it is obvious that this supply in storage will not last indefinitely.

Because of anticipated delays in getting pipe and other equipment, it appears doubtful whether the company will be able to start construction before the end of the year. If authorization and material should be available earlier it is expected that work would start then. On the other hand, if the project should be delayed so long that it could not be built until next year, the company would wish to reconsider the undertaking in the light of changed cost conditions and other considerations.

Failure to Furnish Tank Cars Restricts WEP Throughput

by Paul Reed

NORRIS CITY, Ill.—Although the War Emergency Pipelines, Inc., 24-in. crude-oil line has been completed for full operation from Longview, Tex., to Norris City, Ill., it is not permitted to function at more than half its actual capacity because it has not been furnished enough tank cars for shipments to the East Coast. During March, the failure to make available sufficient tank cars meant that shipments were 1,000,000 bbl. under what they might have been, according to those who have studied the situation. From the 3,600,000-bbl. March throughput, the schedule for April has been stepped up to 5,800,000 bbl., which represents only 60 per cent of the rated capacity of 9,000,000 bbl. per month or 300,000 bbl. per day. All stations are now completed, limbered up and ready to go. Test period runs have demonstrated that the performance of the line exceeds what was anticipated in previous announcements. With all pumps in operation it is now believed that the minimum daily capacity will be about 325,000 bbl.

Recently, tank-car shipments of about 120,000 bbl. plus deliveries to the Ohio Pipe Line Co. totaled about 160,000 bbl. daily. Within the last 10 days there have been several when approximately 600 empty cars have been received at Norris City; one day more than 700 cars and on another day last week more than 800 cars were received.

Railroad interests are reported to have indicated that with present trackage and motive power, a movement of 900 cars daily from Norris City may be reasonably expected; with tank cars averaging 210 bbl. per car this represents a movement approaching 200,000 bbl. per day. Although the railroad interests give no assurance that more can be handled, they are said to be anticipating the handling of a movement of considerably more than 1,000 cars carrying better than 210,000 bbl. per day. In addition to tank-car shipments, from Norris City between 35,000 to 40,000 bbl. of crude are reported being sent daily through the Ohio pipe line to loading racks on its system from which this oil goes by tank car to eastern destinations.

If enough empty tank cars were sent to Norris City it would be reasonable to expect that daily shipments from that point by railroads and pipe line should be about 250,000 bbl.

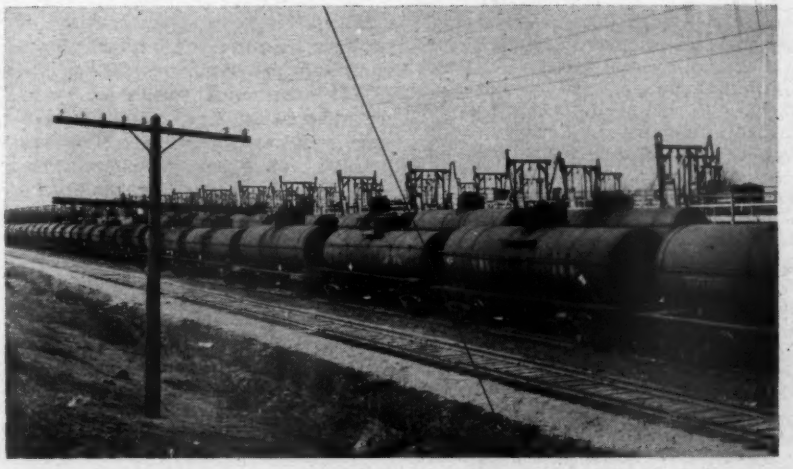
Tank cars for moving oil from the WEP line are furnished by a pool consisting of cars contributed by oil industry organizations. As of March 26, the pool comprised 5,700 cars. To handle April requirements, twice this number of cars will be required for movement from Norris City at the daily rate of more than 900 cars.

Between Norris City and the East Coast there is an 11 to 12-day turnaround.

Loading facilities at Norris City are more than adequate for demands. Trains of 75 cars are commonly loaded and ready to go within 2 or 3 hours after arrival at the WEP Norris City racks which are well equipped and efficiently managed. In the morning no cars are empty which have been received the day before.

After all contingencies have been examined, it is said that the only way to move the WEP oil ordered by major companies for April shipment is to at least double the number of cars in the pool. Responsibility, for determining the number of cars assigned to the pool handling the WEP shipments, is divided among several committees and subcommittees and branches of the Government. Because of the inadequate provisions for WEP it has been concluded by some of those observing the situation that requirements could be dealt with more effectively by some appropriate concentration of authority.

There may be some limitation on the length of time the WEP line could function at full capacity since storage space at Longview, Tex., is less than desired. Nevertheless, because of its national importance, the WEP system seems entitled to enough tank cars to operate at somewhere near capacity, at least for a period which would represent a good complete turnaround.



Trains of 75 tank cars each are rapidly loaded with oil from the WEP 24-in. line and are ready for movement eastward within a few hours after they arrive empty

These oil men sought unsuccessfully to discuss crude prices with Administrator Ickes: E. B. Shawver, Wichita, Kans., J. Garfield Buell, C. E. Buchner, Tulsa; A. W. Larkin and H. C. Cockburn, Houston, Tex.; N. W. Shiarella, Owensboro, Ky.; O. L. Slurbois, Vincennes, Ind.; H. B. Fell, Ardmore, Okla.; George H. Coates, San Antonio, Tex.; Frank Buttram, Oklahoma City, Okla.; F. J. Danglade, Lovington, N. M.; James V. Brown, Washington, D. C.; Walter W. Lechner, Dallas, Tex.; J. E. Brim, Sulphur Springs, Tex.; D. T. Andrus, Bradford, Pa.; J. P. Coleman, Wichita Falls, Tex.; Maj. B. A. Hardey, Shreveport, La.; H. M. McClure, Alma, Mich., and J. B. Cowden, Dallas, Tex. Standing at the end of the table are Larry Smith and Russell B. Brown

Abrupt Dismissal Ends Price Discussion

WASHINGTON, D. C. — An abrupt dismissal was given by Petroleum Administrator Harold L. Ickes to a delegation from the Crude Oil Requirements Committee which called on him by appointment April 2 to discuss prospects for increasing discovery and production of petroleum.

The committee had earlier sent Mr. Ickes a copy of a resolution adopted the week before at its meeting in St. Louis, Mo., and he had agreed to confer with the group in Washington. However, after the group had assembled in his conference room with members of the PAW staff, Mr. Ickes walked in and announced that he did not care to hear anything about oil-production problems and particularly the price situation until he had made up his mind on this matter. When committee members protested that they desired to state their views and present their evidence before he had made up his mind, Mr. Ickes rebuked them for wasting his time and walked out of the meeting.

The oil producers immediately disbanded and adjourned to the Capitol where they called on their senators and representatives to complain about the brusque treatment received.

The committee which met with the administrator was representative of nearly all the principal oil-producing areas in the United States. It was appointed by the Crude Oil Requirements Committee of the producing branch of the petroleum industry at a meeting in St. Louis March 23, 24 and 25. The Crude Oil Requirements Committee was organized last November and consists of representatives of 35 national, regional and state associations of oil producers.

PIWC Questions Necessity for Severe Curtailment

by Henry D. Ralph

WASHINGTON, D. C. — Necessity for present severe curtailment of gasoline sales in District 1 and for continued pressure to convert oil burners to coal are questioned in the monthly report of the petroleum economic committee presented to the April meeting of Petroleum Industry War Council April 6.

The committee also pointed out that lack of advance knowledge of military demands makes adequate planning impossible and consequent disruptions should not be held against the industry. It recommended that study be made of changing refinery runs in Districts 1, 2 and 3, and that meanwhile PAW allocate overland transportation to protect output of essential war products.

The committee's estimates of demand will require total United States crude production of 3,984,000 bbl. daily during the second quarter this year, 4,249,000 bbl. in third quarter, 2,223,000 bbl. in the fourth quarter, and 4,084,000 bbl. average in 1943, and 4,274,000 bbl. in the first quarter of 1944.

Criticism of the inadequacy of projected figures on military consumption, previously voiced by the PIWC economics committee, was repeated at the April meeting. Military requirements, the committee pointed out, have consistently exceeded government figures available to the industry.

Based on estimates of available facilities by the Transportation Division of PAW, the committee forecast District 1 receipts of crude and products for the next 12 months in Table 1.

Probable supply in District 1 is in excess of estimated rationed demand and above consumption at last winter peak and the committee said this would make possible sizable exports this summer without building up stocks provided military takings are held to minimum next winter. These estimates were made before WPB approval of the 20-in. extension to the coast, and the committee recommended that pumps and valves be scheduled to complete alternate pumping stations as soon as line is laid to carry 166,000 bbl. daily pending completion of other stations.

To supply products in proper proportions required, the committee recommends that the Plantation and Helena lines be operated on kerosene and distillate part of next winter but on gasoline during the summer, and that the ban on tank-car shipments of gasoline to District 1 be lifted for the Helena line.

(Continued on Page 31)

THIS WEEK

TRANSPORTATION—Preliminary plans under way for 16-in. line from Slaughter field, West Texas, to Cushing-Drumright, Okla., area. . . . ¶PAW Directive 65 bans cross-hauls, backhauls, all other duplicated transportation in District 2. . . . ¶ODT announces plans for million dollar expansion of tank-car unloading facilities on East Coast, to increase handling capacity 200,000 bbl. per day. . . . ¶WPB, in surprise move, approves eastern extension of 20-in. products line, ending threat of dissention between Gulf Coast and Mid-Continent refiners. . . .

REFINING—Formal directive issued by PAW calls for 40,500 bbl. per day crude pool in District 2, fed on pro rata basis, released at direction of Washington, to keep war-product manufacture at maximum. . . . Plan actually in operation for a month before formalized by Directive 64. . . . ¶PIWC told Districts 4 and 5 processing operations in balance, adjustments downward of gasoline yield still advisable in Districts 2 and 3. . . .

MARKETS—Higher residual fuel prices approved for all sellers throughout Pacific Coast, extending relief originally granted only to California. . . . ¶OPA bans higher ceilings for dry gas in California, normally pegged to fuel-oil prices. . . . ¶Crude-oil requirements committee, spearheaded by I.P.A.A., but representing all associations, abruptly dismissed by Administrator Ickes, without adequate explanation. . . . ¶Compact Commission adds its voice to clamor for higher crude ceilings, chiefly to save stripper wells, reserves they represent. . . . ¶Standard of California advances crude postings, lifting lower gravity oils to ceilings authorized March 26 by OPA. . . . ¶Operators intensify plans to air price complaints before Patman committee next week. . . .

SUPPLIES—PIWC insisting on more accurate information on probable military requirements, saying adequate planning, under present conditions, impossible that industry may receive unjustified criticism. . . . Military requirements, PIWC says, consistently exceed calculations. . . . Warns that California and District 2 will be short of crude in relatively near future. . . .

RUBBER—Director Jeffers considering retirement from government service, sees crisis averted BUT warns continued civilian conservation essential. . . . Observers see chance of relaxing civilian regulations early next year BECAUSE plants are substantially exceeding rated capacities. . . .

MATERIALS—New repair, maintenance and operating supply order (P-98-b) issued. . . . Restrictions not materially changed BUT much red tape, delays eliminated, reducing paper work required of operators. . . . Next order, due soon, will deal with new capital items, construction, additions to plant. . . .

More such "board rooms" as this at an operating center of Shell Oil Co., Inc., will go into service this year for the purpose of following progress of products through pipe lines. Here, time, volume, pressures and other factors are charted from hour to hour and from day to day

Maintenance, Repair and Operating Supplies Are Placed Under New Order

WASHINGTON, D. C. — A new P-98-b order, revising the system for obtaining priorities for oil-industry maintenance, repair and operating materials has been issued by the War Production Board and the Petroleum Administration for War, conforming to the procedures of the Controlled Materials Plan which went into full effect April 1.

This order virtually completes the series of new regulations designed to give the oil industry a relatively permanent and workable system of obtaining and using materials under the CMP. It ties in with Petroleum Administrative Order 11, issued by PAW last week to replace WPB's Conservation Order M-68, and also with P-98-c, issued late last month.

Two more orders in the series are expected shortly. One is Materials Redistribution Program 2, which will make P-98-c fully effective. This order has been on the point of issuance for 2 weeks but the draft is still being studied for legal technicalities. The final order still in process of drafting will be an amendment or supplement to P-98-b to cover acquisition of materials for new drilling and construction. Until this supplement is issued operators will continue to use previous forms and procedures for new projects.

The new P-98-b is limited strictly to materials for maintenance, repair, and operating supplies, but covers all branches of the industry and the entire United States and Canada.

A preference rating of AA-1 and an allotment symbol MRO-P-98-b are authorized for materials for maintenance, repair and operating supplies, under the following conditions:

1. When the cost of any single item is $500 or more, prior submission of the delivery order to Washington PAW office or Canadian Oil Controller for approval is required.

2. When the total cost of all items is $1,000 or more, but no single item is $500 or more, prior submission of the delivery order to district PAW office or Canadian Oil Controller for approval is required.

3. When the total cost of all items is less than $1,000 and more than $100 but no single item is $500 or more, copy of delivery order, for information only, must be submitted to PAW district office or Canadian Oil Controller. Approval is not required.

Emergencies involving actual breakdown or suspension of operations will be handled by telephone, telegram or letter to the PAW Washington office, furnishing certain information indicated in the order.

An operator who has complied with the above provisions may place a delivery order and use the allotment number or preference rating authorized, under following limitations:

1. Place delivery order with supplier and show authorized allotment symbol and preference rating on same.

2. Place delivery order for controlled materials, other than aluminum, as an authorized order, provided operator certifies his right to receive same in the prescribed form and provided such delivery order is in sufficient detail to permit entry on mill schedules. Such orders must be received by the controlled-materials producers at such time in advance as is specified in Schedule 3 of CMP Regulation 1, unless controlled-materials producer, without discriminating among customers, shall accept a late order.

3. Any delivery order, rated, authorized and certified under this order shall have allotment symbol P-98-b and shall have the same status as an order bearing an allotment symbol and preference rating under CMP Regulation 3.

4. An operator requiring aluminum for maintenance, repair and operating supplies, may obtain, from all sources, a total not to exceed 100 lb. per calendar quarter year. He may obtain same from a controlled-materials producer or an approved aluminum warehouse by endorsing the delivery order with the special form of certification provided in P-98-b for such cases.

Full Text of Order P-98-B

PART 1041—PRODUCTION, TRANSPORTATION, REFINING AND MARKETING OF PETROLEUM

(Preference Rating Order P-98-b as amended April 1, 1943)

§ 1041.2. **Preference Rating Order P-98-b (a)—Definitions.** (1) "Person" means any individual, partnership, association, business trust, corporation, governmental corporation or agency, or any organized group of persons, whether incorporated or not.

2. "Operator" means:

(i) Any person located in the United States, its territories or possessions, to the extent that he is engaged in the petroleum industry or

(ii) Any person located in the Dominion of Canada to the extent that he is engaged in the petroleum industry and to whom and in whose name a copy of this order or of Preference Rating Order P-98, extended and amended, is or has been specifically issued and to whom a seria. number has been assigned.

3. "Supplier" means any person with whom a delivery order is placed for delivery of material to an operator or to another supplier.

4. "Petroleum" means petroleum, petroleum products and associated hydrocarbons, including but not limited to natural gas.

5. "Petroleum industry" means any operation directly incident to:

(i) The discovery, development or depletion of petroleum pools (production);

(ii) The extraction or recovery of natural gasoline and associated hydrocarbons (natural gasoline production);

(iii) The transportation, movement, loading or unloading of petroleum other than natural gas (transportation);

(iv) The processing, refining or compounding of finished or unfinished petroleum products ((refining);

(v) The distribution or dispensing of petroleum products (other than natural gas) and the storing of petroleum products incident thereto (marketing);

(vi) The investigation into more efficient or more effective methods of conducting petroleum-industry operations by means of research or technical laboratories (research).

6. "Material" means any commodity, equipment, accessory, part, assembly, or product of any kind.

7. "Maintenance, repair and operating supplies" means that material specified in Schedule A hereof.

8. "Controlled material" means steel—both carbon (including wrought iron) and alloy—copper (including copper-base alloys) and aluminum, in each case only in the forms and shapes indicated in Schedule 1 attached to CMP Regulation 1 of the War Production Board.

9. "Allotment" means a determination by the Petroleum Administration for War as to the portion of its allotment of controlled materials which may be received by an operator.

10. "Class A product" means any product which is not a Class B product (as defined in Subparagraph 11 below), and which contains any steel, copper, or aluminum, fabricated or assembled beyond the forms and shapes specified in Schedule 1 attached to CMP Regulation 1, other than such steel, copper, or aluminum as may be contained in Class B products incorporated in it as parts or subassemblies.

11. "Class B product" means any product listed in the "Official CMP Class B Product List" issued by the War Production Board, as the same may be modified from time to time, which contains any steel, copper, or aluminum, fabricated or assembled beyond the forms and shapes specified in Schedule 1 attached by CMP Regulation 1, other than such as may be contained in other Class B products incorporated in it as parts or subassemblies.

12. "Delivery order" means any purchase order, contract, release or shipping instruction which constitutes a definite and complete instruction from a purchaser to a seller calling for delivery of any material or product. The term does not include any contract, purchase order, or other arrangement which, although specifying the total amount of to be delivered, contemplates that further instructions are to be given.

(Continued on Page 135)

Federal Order Digest

Petroleum Administration

Distribution—PD 65: Divides Middle West into 26 zones for rearrangement of supply and distribution system for motor fuel, kerosene and distillate heating oils; creates 11 zones for residual-fuel distribution; directs distribution from nearest terminal, regardless of ownership of facilities or products, effective, issued March 17, filed April 1.

Crude Oil—PD 64: Formalizes pooling of about 40,500 bbl. of crude oil daily in PAW District 2, supplied proportionately by all companies which ran 2,000 bbl. per day or more of crude from producing leases in December 1942, issued March 12, filed April 1.

Fatty Oils—PAO 10: Limits the amount of fatty oils that may be used in the manufacture of certain lubricating greases, supersedes and revokes PAW Recommendation 58, except for the report due April 15, effective March 27.

Well Spacing—PAO 11: Supersedes and replaces WPB Conservation Order M-68, becoming basic petroleum order on well spacing, restricting use of materials; classifies distillate fields, effective March 30.

Spacing Exceptions—PAW Form 3: Stipulates necessary information for granting exception to PAO 11, effective March 30.

Construction Exceptions — PAW Form 4: Lists information required to obtain exception for construction incident to extraction of natural gasoline, effective March 30.

Natural Gas—PAO 11, SO 1: Grants exception to natural-gas production operations in the Appalachian region, southeastern Kansas, northeastern Oklahoma and all of Missouri, effective March 30.

Secondary Recovery—PAO 11, SO 2: Permits closer spacing in the discovered oil fields of Allegany and Cattaraugus counties, New York, and McKean, Warren, Crawford, Forest and Venango counties, Pennsylvania, and for new drilling in New York, Pennsylvania and West Virginia, effective March 30.

Recompletion—PAO 11, SO 3: Permits use of materials for plugging back any well in the Smackover field, Ouachita and Union counties, Arkansas, effective March 30.

General Exception—PAO 11, SO 4: Renumbers Section 1047.8 of Supplementary Order M-68-3 to Section 1515.10, Chapter 13, and reissues order, effective March 31.

Well Spacing—PAO 11, SO 5: Renumbers old Petroleum Administrative Order 2, making it Section 1515.11 of Chapter 13, and reissues previous exceptions for shallow wells in Illinois and portions of Indiana and Kentucky, effective April 1.

WPB Regulations

Manila Cordage—M-36, amended: Continues present restrictions on sale and delivery of manila cordage for 3 months, effective April 1.

Steel—M-21-b-2: Sets up procedures for the distribution of steel through warehouses and dealers, effective April 1.

Steel—M-21-b-1: Covers deliveries to warehouses and dealers distributing general steel products, effective April 1.

Steel Drums—M-255, amended: Prohibits manufacturers from selling, delivering or using new steel drums and parts, except flanges, plugs and cap seal, without specific authority from WPB; specifies use of Form PD-835, effective March 29.

Precision Tools—GPO E-5a: Simplifies procurement by machinists and other workers of new gages and precision measuring hand tools needed in their employment, effective March 26.

OPA Regulations

Fuel Oil—RPS 88, Amendment 88: Broadens 25-cent increase to include all sellers of heavy fuel oils in Washington, Oregon, Nevada and Arizona as well as California; prohibits higher fuel-oil base as justification for higher prices of dry gas, effective April 1.

Hydrocarbons—RPS 88, Amendment 86: Exempts certain hydrocarbon fractions and components used in the manufacture of high-octane gasoline and synthetic rubber from price control, effective March 30.

Cooling Towers—MPR 253, Amendment 2: Permits redwood producers to use an average sales price in setting ceilings on cooling-tower stock, effective April 5.

Rubber Products — MPR 300, Amendment 5; MPR 220, Amendment 6; MPR 149, Amendment 8; MPR 157, Amendment 7, and MPR 119, Amendment 2: Authorizes sales agreements for future delivery of rubber products for the Government to be made for prices higher than maximums now in effect, all effective April 1.

Welding Equipment — MPR 136, Amendment 73: Stipulates inclusion of nonelectrical welding equipment, including welding rods, welding wire, electrodes and supplies in the price order, effective April 8.

Rubber—MPR 143, amended: Establishes separate maximum wholesale and retail prices for factory "second" new tires and tubes for passenger automobiles and trucks, effective April 8.

PIWC Questions Necessity For Severe Curtailment

(Continued from Page 28)

Declaring the rationing of gasoline below 3 gal. per coupon unit makes available relatively small additional volumes for export, the committee recommended that there be called to attention of the proper authorities the desirability of balancing military value of any increase in export availability resulting from such stricter rationing against the effect upon the civilian economy, public transportation facilities, and the industrial war.

Government Estimates Low

The committee also said: "In regard to the West Coast, supplies available for government requirements (largely military) are determined mainly by crude oil producing capacity past takings by governmental agencies have been substantially under their estimates. Recent estimates of such requirements are not available, but if the full requirements under the old estimates are taken in the future, increases in crude-oil production would be required above the present estimates of the District 5 production committee of California's current ability to produce on an efficient basis. Although District 5 has substantial reserves of product stocks meeting federal specifications, the problem of adequate crude supplies is an important one. It is understood that this question is under study by the proper production agencies in District 5, and it is expected that such study will include estimates of the critical material requirements for increasing California crude-oil production. When these are received this committee will compare them with the critical material requirements for augmenting California supplies from other sources.

"The refinery operations in Districts 4 and 5 are substantially in balance, and no difficulty is anticipated in maintaining balanced operations in these areas.

"Runs included in the program of Districts 1, 2 and 3, are those recommended by the respective refining committees of those districts, and are made up of the sum of the estimated minimum runs for war product plants, plus runs at nonwar plants deemed essential to conserve transportation, these runs are in excess, by approximately 105,000 bbl. daily over the period, of the possible runs in the three districts, as limited by local rationed demand in Districts 2 and 3 and by available transportation to District 1. The excess during the second quarter of 1943 is estimated at 160,000 bbl. daily. The problem of adjusting these over-all runs to avoid this excess involves, in the case of war plants, the extent to which runs can be reduced by modifying process

procedure and exchanging products between plants, and in the case of both war and nonwar plants, transportation considerations in relation to local demand also enter the picture. Since this problem involves all three districts, a joint cooperative study covering specific plant operations is necessary for its solution by representatives from each district of the proper agencies involved with prompt action by the PAW to allocate crude runs to stills on the basis of the facts developed.

"Until runs can be reduced to balance, as the result of the combined study by the proper agencies, the PAW should allocate overland transportation in such a way that the efficiency of tanker use and the output of war products is protected, even though overland transportation is sacrificed. The sacrifice in overland transportation that must be suffered would be taken in such a way as to minimize the detrimental effect of reduction in export availability from the Atlantic seaboard, in accordance with PAW's information on military requirements.

"It should be added that the District 2 program of crude runs calls for an excessive draft on crude stocks due to the decline in Oklahoma, Illinois and Kansas production, even if the proposed District 2 runs should be curtailed somewhat during 1943. By early 1944, a shortage of available crude for this district appears inevitable. The most feasible way to get a substantial increase in such crude supplies apparently would be to construct a line from West Texas to northern Oklahoma, which would utilize available line space from Oklahoma north, and also afford an increased outlet for the large reserves in West Texas.

"The refinery yields used in the balanced program are those recommended by the district refining committee. It is not expected that any difficulty would be encountered from a yield standpoint, if crude runs were reduced to secure a balanced program within the limits of available storage. The proportion of gasoline to other products in the supplies indicated as available for export is relatively high, and if this does not coincide with military requirements, information should be made available on this point as soon as possible so that the industry may take the necessary steps to reduce gasoline production and increase that of fuel oils."

TABLE 1

Forecast of District 1 Petroleum Supply
(Thousands of barrels daily)

	Second quarter	Third quarter	Fourth quarter	First quarter 1944
Rail	928	824	879	882
Pipe lines	211	520	492	469
Water borne	221	219	221	178
Ttl. receipts	1,360	1,563	1,592	1,529
Local prod.	77	74	73	72
Total new supply	1,437	1,637	1,665	1,601

Note: Figures include effect of pipe-line projects carrying oil part of the way for final transshipment by tank cars and movements in drums during the second quarter. Water-borne figures include ocean tankers, lake tankers and barges.

State Capitals

OKLAHOMA

THE COMMITTEE appointed by the Corporation Commission to study the matter of special allowables for discovery wells has submitted a report in which it lists proposed methods of granting such allowables. The report follows:

1. Discovery allowables should be granted to encourage the discovery of new sources of supply of crude oil in Oklahoma.

2. Only one discovery allowable should be granted for each separate geologic structure.

3. A minimum of 5,000 bbl. be granted regardless of depth, and the following increasing scale be used as a basis for determining discovery allowables.

Depth in ft.—	Basis of discovery allowable
0-3,000	3.00 bbl. per ft.
3,000-4,500	4.50 bbl. per ft.
4,500-6,000	6.00 bbl. per ft.
6,000-7,500	7.50 bbl. per ft.
Above 7,500	10.00 bbl. per ft.

Illustration of recommendation: On a well 6,800 ft. in depth, the discovery allowable as computed on the above basis would be as follows: For the first 3,000 ft., 3 bbl. per ft., or 9,000 bbl.; for the next 1,500 ft., 4½ bbl. per ft., or 6,750 bbl.; for the next 1,500 ft., 6 bbl. per ft., or 9,000 bbl.; for the next 800 ft., 7½ bbl. per ft., or 6,000 bbl., making a total of 30,750 bbl.

The depth used for computing discovery allowable shall be the depth to the top of the producing formation.

4. Discovery allowable shall be produced on daily basis in 1 year unless such rate of production is found to create waste.

5. Discovery allowable should be produced from the discovery well and subsequent wells of the discovery operator by dividing the discovery allowable equally among them.

6. The operator of any discovery well shall within 30 days after the date of final completion of the well make application for discovery allowable to the conservation officer.

Members of the committee are: W. A. Delaney, Jr., Ada, chairman; D. A. Howard, Cities Service Oil Co.; William T. Payne, Big Chief Drilling Co.; C. C. Moss, Deep Rock Oil Co.; R. L. Reagan, Stanolind Oil & Gas Co.; Roy Johnson, Ardmore, and Dan C. Howard, Corporation Commission

TEXAS

ALLOWABLE production in May will be determined on the basis of testimony presented at Fort Worth, Tex., April 16 by producers and purchasers, it was announced last week by Beauford Jester, chairman of the Railroad Commission. The commission expects to have accumulated considerable information about the utility of West Texas sour crudes for presentation at the hearing in Fort Worth. Questionnaires have been sent to numerous refiners and crude-oil purchasers asking for specific information on the utility of Permian basin production, its limitations in the refining of war fuels and to what extent manufacturers' facilities permit the use of this type of crude.

COLORADO

THE COLORADO LEGISLATURE adjourned without taking a formal vote on a measure authorizing the creation of the Colorado Power Authority to acquire the gas and electric properties of the Public Service Co. of Colorado and to engage in the production of natural gas. It was one of the most controversial measures before the general assembly and had for its object the putting of the state into the public utility business. The company is a subsidiary of Cities Service which soon may face the necessity of disposing of the Colorado property under the Securities Exchange Commission Act. The house appointed an interim committee, without appropriation, to study the proposal following the adjournment of the legislature. The senate voted down a proposal for a joint committee. No important legislation affecting the oil industry was enacted by the legislature.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

When Do We Start Using Geology?

PAPERS presented this week at the Wartime Conference of the American Association of Petroleum Geologists and affiliated societies show that the exploration departments are fully cognizant of the nation's present precarious position with respect to new oil reserves. They also reveal that the geologists are beginning to get restive under the restrictions now placed upon their efforts.

Companies which have maintained geological departments and have added large geophysical organizations over a period of years may be surprised to learn that in the opinion of many prominent geologists they have hardly begun to use geology.

The fact is, however, that up to the present time, it has been necessary to avail ourselves of only a fraction of our geological ability and knowledge.

The anticlinal theory, which developed into the structural theory, of the occurrence of oil was known for nearly 60 years before it was freely accepted by the oil industry. Until demand was pyramided by the mushroom growth of the automobile industry added to World War 1, the nation's oil requirements could be met by random drilling and by what has been termed "unconscious geology."

Later, geophysical methods of determining structures were added to geological methods. For a quarter of a century structural geology, combined with random drilling and occasional use of other geological methods, kept supply ahead of demand.

It is now necessary to take an additional step.

A single device, the subsurface contour, enabled company heads to see the utility of structural geology. Now the geologists may have to find some other way of selling their science.

It is generally admitted that much, possibly more than half, of the oil now being produced does not lie on structures which can be detected by standard methods of prospecting. The list of what is called stratigraphic traps is large. Lensing sands, porosity zones caused by weathering, buried shore lines, sand bars, river beds and other geological features are known to contain oil. They may be found by random drilling but they may also be found by geological reasoning of the same type as that which developed the anticlinal theory.

These geological features can be discovered provided the industry places enough confidence in its geologists to permit them to try to find them. It will be a difficult task but geologists believe that it can be done more economically and more successfully by the application of geological methods than in any other way. They realize that if they have to "sell" their ideas by means of easily understandable devices such as contour maps that selling may be a more difficult task than finding the buried reservoirs.

Many of the phases of geology needed have been employed by oil company geologists who wanted more than a closed contour or two before they recommended drilling. There is, in existence in company files, a vast supply of exactly the type of information which will enable geologists to satisfy themselves concerning the desirability of prospecting new areas or to new potiential pays.

A quarter of a century of the successful application of one phase of geology ought to have convinced the industry that it is necessary to use the full complement of geological knowledge. The discoveries are badly needed. The industry's expert geological staffs require only the green light.

A Survey of the Nation's Oil Reserves and Needs

*by W. B. Heroy**

Since 1937 there has been a sharp falling off in newly discovered oil.

In recent years we have not discovered the amount of oil we have produced.

The largest discoveries have been in areas farthest removed from consuming centers.

Productivity capacity has no direct relationship to reserves.

Laws that will expedite unitization needed.

The foregoing are some of the conclusions of Mr. Heroy in his survey of the nation's petroleum reserves and needs at the Wichita meeting of the Interstate Oil Compact Commission, April 3. The forepart of his paper which is not reproduced here dealt with the technique used in evaluating reserves.

FROM the time of the first estimate of reserves of recoverable oil in known fields (1908) down to the most recent, as of the beginning of the present year, the figures have shown an increase each year in the total of proved reserves remaining after deduction of the oil produced. Over the period from 1908 to 1927 the estimates of remaining reserves increased very moderately, reaching at the end of the period a figure of about 5 billion barrels. During the following decade, to 1936, the current estimates of remaining reserves increased to over 12 billion barrels. During the next 3 years, from 1937 to 1939, the rate of increase reached its maximum and the total rose to about 18.5 billion barrels at the end of the period. For the last 3 years the annual rate of increase has been somewhat less and the total, according to the estimates of the American Petroleum Institute now stands at just above 20 billion barrels.

In the A.P.I. estimate the reserves of new pools discovered during the year are segregated but the extensions and revisions are not separated. Annual increases through extensions and revisions are three to five times as large as the increases shown as resulting from new discoveries. In view of the manner in which each of these components is estimated, this is the result to be expected. But when the figures representing the reserves of newly discovered pools are considered separately, a downward trend is shown, commencing in 1937. It is, doubtless, true that in each year the geologists who were engaged in estimating the reserves of these new pools operated on about the same basis.

The initial estimate of newly discovered oil in 1937 was the highest, 929 million barrels. From that time the initial estimate for each succeeding year has shown less oil discovered until in 1942 the total is only 260 million barrels, only 28 per cent of the 1937 figure. Our office has made an independent initial estimate of 317 million barrels of oil found in new fields in 1942. The two estimates thus signalize a year of very low discovery in 1942. All things considered, we must face the fact that there has been since 1937 a sharp falling off in newly discovered oil.

May I point out also that, to the extent that these figures represent revisions, they reveal nothing as regards new discovery. They simply represent the engineer's new view as to how much oil there is in the field. They do not represent a barrel of newly found oil, only a new appraisal of a field previously found.

All these factors point to a single conclusion, that over a period of 3 or 4 years we have not discovered anywhere near the amount of oil we have produced.

But this is by no means the only critical defect in our discovery picture. Practically all the increases in reserves, and especially those resulting from new discovery, are concentrated in the Southwest, in Texas and Louisiana. The reserves of these two states have increased over a billion barrels in 2 years. During the same period the reserves of District 2 have remained about stationary while those of California have somewhat decreased. Thus the maximum increase in reserves has occurred in the area farthest from the center of demand, the eastern seaboard.

The decrease in the discovery rate would not be cause for undue alarm if it were possible to increase at will the rate of production from our more than 3,500 oil fields. If our reserves could all be produced in 10 years or in 14 years, for that matter, we should have ample immediate supplies to conduct the war and could let the future take care of itself. Productive capacity bears no such direct relation to reserves. Our 400,000 producing wells may be divided into three classes: First those that are flowing, comprising about 12 per cent of the total; next, those which are on artificial lift but still are capable of good production, about 15 per cent of the total. The remainder, about 73 per cent, are stripper wells and yield only about 15 per cent of the total production. Thus 27 per cent of the producing wells, those that flow and those recently placed on the pump, produced in 1941 about 85 per cent of the nation's oil. About 10 per cent of California's wells are flowing; 40 per cent of Texas', and 34 per cent of Louisiana's—these three states accounting for over 90 per cent of the flowing wells.

Normal Decline 400,000 Bbl.

When the oil fields of the country are considered collectively, there is a normal decline in production from one year to the next of about 400,000 bbl. per day in productive capacity. If capacity is to be fully maintained it is necessary each year to find new fields and drill new wells to offset this normal decline, and, if productive capacity is to be further increased to meet war demands, then discovery and development must be further accelerated.

As we look back on the record of the last 3 or 4 years it becomes clear that, commencing with 1938, there was also a decisive change in the results of new development. In each year since 1937 the total of the initial daily production has greatly decreased, as shown by the following tabulation:

Year	Oil prod. comp.	Initial oil prod. bbl. daily	Average per well
1937	22,481	24,222,121	1,077
1938	18,544	16,872,791	909
1939	17,687	10,512,729	594
1940	19,225	10,227,178	532
1941	19,472	8,822,500	453
1942	10,954	2,841,300	259

When it is considered that it is the relatively young wells which yield the flush production and that we are dependent on such wells for 85 per cent of our production, the decline in initial production becomes cause for serious concern.

It is, therefore, incumbent upon those of us here present, representing both state and federal authorities to place ourselves squarely behind every measure that will stimulate new discovery and increase productive capacity. Laws that will bring about conservation to prevent the dissipation of reservoir energy and that will permit the unitization of oil fields are urgently needed in several states.

*Director of Reserves, PAW.

Oil Compact Commission Endorses Higher Ceilings for Crude Prices

by C. O. Willson

WICHITA, Kans.—The Interstate Oil Compact Commission at the conclusion of a 2-day meeting here April 2 and 3, at which several phases of the current oil situation were discussed, in two resolutions went on record in favor of higher ceilings for crude oil.

The first resolution had to do with conditions in the stripper-well areas which were covered in detail in a report submitted by E. G. Dahlgren, executive secretary of the research and coordinating committee of the commission which completed a nation-wide survey and submitted it to the compact membership at this meeting. In a resolution directed to President Roosevelt, OPA, PAW and WPB the commission asked that "the problem of preserving stripper-well production be given prompt and careful consideration, and the governmental restrictions and regulations causing premature abandonment of stripper wells be relaxed. Parity prices for petroleum would insure continued operation of these small essential war plants and would likewise stimulate drilling and exploration operations for additional reserves. An immediate adjustment of the low ceiling prices of petroleum and its products is necessary and is recommended."

In a second resolution the commission found that "there is imminent a serious shortage of current producible oil in this country" with the oil producer "faced with shortage of funds, manpower and materials." The resolution directed to the president, Congress, and the war agencies emphasized the need of higher prices for crude oil and products.

This resolution said in part: "The independent has in the past discovered most of the new oil fields. He will do it again if the Government will permit the price to advance to cover costs and provide a proper incentive. This method has always worked in an economy of free enterprise. It is reasonable to assume that it will work now and again provide the oil."

Taking cognizance of the shortage of crude-oil supplies in Oklahoma, Kansas, and the Middle West the commission went on record as favoring the construction of a line from the large supplies of West Texas and New Mexico to Central Oklahoma where connection could be made to lines now serving the northern Mid-Continent and middle western areas. While the project was not mentioned in the resolution it is assumed the committee's action gives approval to the 16-in. line which Stanolind Pipe Line Co. has asked Government's permission to build connecting the Slaughter area in West Texas to Drumright, Okla.

Status of Reserves

Considerable discussion followed the paper by W. B. Heroy, director of reserves, PAW, who presented a "Survey of the Nation's Petroleum Reserves and Needs" (see opposite page). Regarding unitization, wider use of which was advocated by Mr. Heroy, one operator contended that

Members of the executive committee of the Interstate Oil Compact Commission and other representatives of the state regulatory bodies at the Wichita, Kans., quarterly meeting April 2. Seated (left to right): W. M. Downing, Denver, Colo.; Clarence T. Smith, Flora, Ill.; Gov. Andrew F. Schoeppel, Topeka, Kans., chairman of the commission; W. H. McFadden, Fort Worth, Tex.; J. L. McHugh, New Orleans, La. Standing (left to right): John M. Kelley, Santa Fe, N. M.; Ray O. Weems, Oklahoma City, Okla.; E. G. Dahlgren, Oklahoma City; secretary of the research and coordinating committee; Col. E. O. Thompson, Austin, Tex., member, Texas Railroad Commission; F. R. Frye, Lansing, Mich.; J. C. Hunter, Abilene, Tex.; Charles L. Orr, Oklahoma City, secretary of the commission

ultimate recovery would be greater under competitive development than under unitization. Opposition to compulsory unitization was expressed. J. C. Hunter of Texas said there was no danger of compulsory action, explaining that all anyone had in mind at this time was to obtain legislation which would authorize unitization on a voluntary basis. This legislation, he explained, is designed in part to protect operators from antitrust prosecution when they endeavor to pool their operations.

Col. E. O. Thompson, of the Texas Railroad Commission, pointing to accomplishments in the East Texas field, contended that unitization is not necessary to get the most efficient production and the greatest recovery. He explained the operation of the East Texas field from the standpoint of maintaining bottom-hole pressures including the recent results obtained in the injection of salt water.

Proponents of unitization pointed out that the main objective in unitization was to obtain the maximum production from an area with the minimum use of materials. It was also stated that data are available showing that fields under unitization get more oil currently per pound pressure drop than do fields which have been developed competitively.

Educational Program

The commission will give further consideration as to how that body can further an educational program designed to acquaint the public with the problems and accomplishments of the petroleum industry.

The afternoon session, April 2, was devoted to the educational program and the showing of moving pictures dealing with the oil industry's operations. The pictures were presented by M. F. Leopold, of the Bureau of Mines, and by representatives of Humble Oil & Refining Co. Mr. Leopold said that the oil pictures on which more than a million dollars have been spent through the sponsorship of oil companies, now have a complete schedule for presentation extending over a period of several months. He said he had no trouble securing funds from oil companies to finance the taking of pictures for this phase of the educational program.

The report on stripper wells showed that as of January 1, 1943, 293,281 of the nation's 407,257 producing oil wells were of the stripper class. Their average production is 1.9 bbl. per well with a total production in 1942 of 203,203,812 bbl. The stripper areas were given a reserve of 1,240,351,099 bbl. with 2,429,776,410 bbl. recoverable by secondary-recovery methods. This represents 18 per cent of the total estimated reserves.

Gov. Andrew F. Schoeppel of Kansas, chairman of the Compact Commission, presided at the business session and was the principal speaker at the dinner tendered April 2 by Kansas oil operators. Clarence T. Smith, of Flora, Ill., member of the commission from Illinois, presided at the dinner.

All of the member states of the commission with the exception of New York and Pennsylvania were represented at the meeting. Charles Orr, secretary of the commission, reported that three states—Michigan, Texas and Kansas—have extended their compact membership for 4 years. A bill providing for an extension has been presented in the Illinois Legislature and it is believed that favorable action will be taken in all the other states now members. It is expected that Ohio will shortly enter the compact as a new member.

District 2 Zoned to Curb Distribution Overlaps

WASHINGTON, D. C.—The 15 middle western states (District 2) last week were divided into 26 zones for the distribution of motor fuel, kerosene and distillates for the purpose of achieving five major transportation economies. Objective of the rearrangement of petroleum-supply channels is to free additional tank cars for East Coast service.

Details of the plan, along with the zoning arrangement, have been in circulation among members of the industry for several weeks. Many of the goals sought by Directive 65, issued as a formal order last week, have been achieved by exchange of products and joint use of facilities.

Directive 65 provides for appointment of a manager by the PAW District 2 general committee who shall arrange for purchases, sales, exchanges and loans of petroleum products among, and for the common use of facilities by original suppliers in the district only when any such transaction will:

1. Eliminate or shorten the movement of petroleum products by pipe line, lake tanker, barge, tank car, or transport truck facilities within the confines of District 2.

2. Eliminate a movement or movements of petroleum products from District 1 to District 2.

3. Eliminate a movement or movements of petroleum products in a generally southerly or westerly direction and substitute therefor a movement in a generally northern or easterly direction.

4. Result in a substitution of a pipeline movement of petroleum products by lake tanker, barge, tank car or transport truck.

5. Eliminate any crosshauling or backhauling.

6. Result in furnishing petroleum products to original suppliers from refineries or terminals within each respective zone.

DEATHS

Robert L. Meredith, who was employed by Spartan Oil Co. for 17 years before he entered the Army last year, was killed in action February 12, and was buried in Tulsa this week. No details of his death were made available. His widow survives.

Floyd L. Shuler, 59, employe of Wolf's Head Oil Refining Co., Reno, Pa., for 42 years, died last week, presumably from an accident suffered while on duty at the refinery. He was foreman of the filter house.

Fred J. Meyer, petroleum engineer, formerly on the staff of Kenneth H. Ferguson, consulting geologist, Houston, Tex., died April 2 at Fort Belvoir, Va., where he was attending officers' candidate school. He graduated in petroleum engineering from University of Minnesota. His wife survives.

Robert F. Clement, 48, head accountant of all production departments of Texas Co., died last week, following an illness of several months. He had been with the company since 1919. Mr. Clement was a Mason, and a member of the Brae-Burn Country Club. His widow and a daughter survive.

John Evans Jones, 60, who as a young man pioneered in natural-gas fields at Nowata, Okla., died in Kansas City, Mo., last week, following a cerebral hemorrhage. In his later years, Mr. Jones was an insurance executive and a director of the American Jersey Cattle Club.

Eber John Neely, 90, one-time drilling contractor in the early Pennsylvania excitement, died last week at his home at Knox, Pa. Following his retirement from the oil business, Mr. Neely continued to farm. A son survives.

Harold Clinton Ridge, 48, died at his home in Tulsa Monday, after a pulmonary hemorrhage. Mr. Ridge was warehouseman at W. C. Norris Manufacturers, Inc. His widow, two daughters and a son survive.

Allen K. Riddle, 67, retired official of Shell Pipe Line Corp., died last week. Mr. Riddle came to Oklahoma in 1917 as general superintendent of pipe lines for the southwestern states for the old Roxana, and supervised the building of the first line from Cushing to St. Louis. He retired in 1939.

L. B. Antriken, 41, employe of Texas Pipe Line Co., at Apache, Okla., died while en route to a Lawton, Okla., hospital, of a heart attack.

The Geologist in the War

by Fritz L. Aurin*

The next 22 editorial pages of this issue are devoted to some of the outstanding papers presented at the Wartime Conference of the American Association of Petroleum Geologists and affiliated societies.

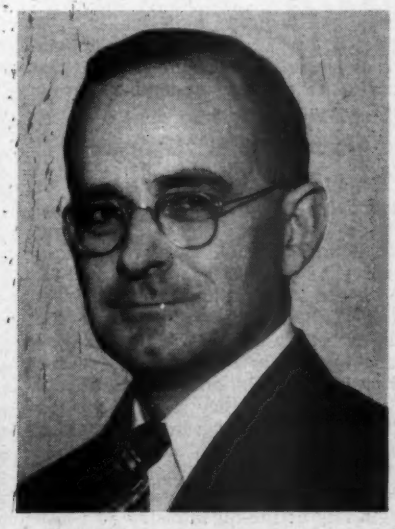
NOT so many years ago, geology was studied and used in a purely scientific manner, but later practical applications began to be made in the mining industry and the development of the natural resources. Then all of a sudden, a geologist, I. C. White, expounded the anticlinal theory of oil accumulation, although others may have suspected the condition at an earlier date. From that time on, the parade of progress for the geologist in the petroleum industry became a reality. The efforts of the geologist were received with considerable skepticism and ridicule, but this did not stop him. The operators in that day were using practical geology to some extent without knowing it and that word "geology" when mentioned was beyond their comprehension and was taboo; at any rate, in spite of all this, the petroleum industry grudgingly and gradually accepted the geologist. As time went on he has become one of the most important members of its organizations in the exploration and development of oil fields. In more recent years, the geophysicist has entered the field and, together with the petroleum geologist, has been the means of discovering many great oil fields. At the present time, both of them are working hand in hand to prospect and explore for new reserves and do their utmost, not only to replace depleted reserves, but also to discover and conserve new fields and new producing formations. In this gradual climb to a place of prominence in industries, the geologist has learned by experience to use all the skill at his command and be very resourceful in his work—with a record hardly equalled by any other professional group. There are approximately 4,500 geologists in the Western Hemisphere and at least

(Continued on Page 62)

*President, American Association of Petroleum Geologists. Mr. Aurin's presidential address is published with permission of the A.A.P.G. and will be reprinted in a later edition of the bulletin of the association.

F. L. Aurin, president of the American Association of Petroleum Geologists

H. L. Driver, president of the Society of Economic Paleontologists and Mineralogists



Frank Goldstone, president of the Society of Exploration Geophysicists

DISCOVERY THINKING

by A. I. Levorsen

A. I. Levorsen, consulting geologist of Tulsa, has been chairman of the A.A.P.G research committee for the past 5 years. He is also a past president of the association. Under his leadership a large number of subcommittees have been engaged in furthering the advance of petroleum geology in all its branches and meetings of these groups have come to occupy a very important place in the association's activities.

EVERY man, woman, and child in the United States had a stake in the oil industry during times of peace, but now that we are at war, the stake is infinitely greater, for, as top-ranking government officials say, "petroleum is one of the most essential of war industries." This stake is expressed in many ways; through ownership in the industry; in utilization of its products as fuel, power or raw materials; in an appreciation of the many taxes paid by the oil industry; and finally, in the applications of petroleum and its products to war. The affairs of the petroleum industry have outgrown the simple business of producing, manufacturing and selling petroleum and its products and they are now of universal military, economic, social and political importance.

Because of this public interest in petroleum, society in planning and thinking of its future has the right continually to ask "how long can we depend on a supply of petroleum adequate for our needs?" "What about the future reserves?" "Can we continue to build an economy based on an abundance of raw materials in the form of petroleum and gas?" And we in the oil industry, as the custodians of this national resource, should continually be prepared to give answer so that the time does not come when the public finds that it has been misled; when, instead of scarcity there is plenty; or when, instead of plenty there is scarcity. Much planning—economic, military and political—will be affected by the answer and it becomes a public responsibility that the answer be as accurate and as up to date as possible.

Future Needs Projected

The chart in Fig. 1 is designed to indicate the future needs by the projection of our past record of growing supply and demand. Here we see that during the next 20 years, or by 1963, if we are to maintain the same rate of increase in production as in the last 20 years, and if we are to continue to have as a discovered reserve 13 or 14 times the annual production, it will be necessary that there be discovered the staggering amount of 50 billion barrels of new oil. This is a greater amount than has been discovered by all methods since the beginning of the oil industry 80 years ago. The present trends, when projected into the future, indicate a steadily increasing tempo of discovery, production and consumption. We are talking about a lot of oil and in the light of our current decline in rates of discovery in the face of steadily increasing war needs, we have something deserving the most serious and careful attention.

While much oil has been discovered by purely random drilling, much will most assuredly be discovered through such means in the future, yet the only rational way to make available to society the oil and gas which now lies underground as the undiscovered reserve, is through the application of scientific methods and reasoning. It is the one approach which offers reproducible results. A correct scientific principle applied to the accumulation and occurrence of oil and gas can be applied repeatedly to Oklahoma, to the United States or throughout the world—this year, next year, or a hundred years from now. It becomes a foundation upon which we can build indefinitely into the future.

As we have seen, the normal future expansion of the petroleum industry calls for discoveries on a scale which to many is almost, if not, impossible of achievement. Some feel that the decline in discovery rate is because of the approaching exhaustion of our ultimate reserves—that we are scraping the bottom of the barrel, in other words. If this should prove to be the case, the situation is indeed serious. On the other hand it may be due to an insufficient discovery effort in which case something can be done about it.

The first part of what follows is intended as a contribution to our foundation of geological principles which apply to the search for new reserves in the form of new oil provinces. The second part is concerned with some ideas for improving the

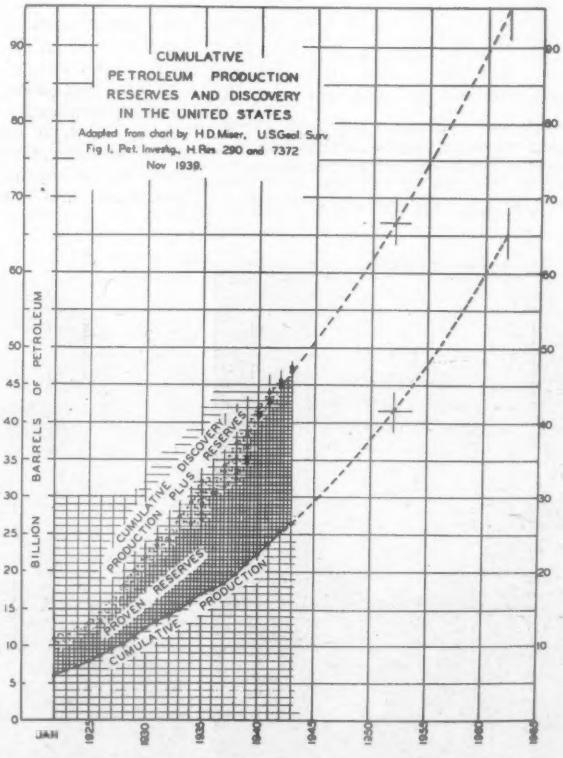


Fig. 1: Past trends in petroleum production and reserves in the United States projected into the future. The upper black dots indicate estimates of reserves by various authorities in different years

discovery effort from a strictly geological viewpoint.

Undiscovered Reserves

Whether the declining discovery is the result of lack of oil to be discovered, or to lack of effort, there is one factor which enters into the over-all problem and that is, that from a national viewpoint we are too often thinking in too small terms. By far the greatest part of our effort is in searching for extensions to pools already discovered, in searching for deeper sands, and in working and reworking progressively smaller and smaller areas within the developed provinces. We finally get to think almost exclusively in terms of individual oil fields, when we should be thinking in terms of oil provinces; in discoveries of millions of barrels, when we should be thinking in terms of billions of barrels; and in acres of new production when we should be thinking in square miles. If you agree that our work is essential to the future oil supply of the nation, it means that we must turn an increasing part of our thinking into terms of not one but many wholly new oil provinces. It means that we must attempt to think in terms of a steady procession of major oil discoveries into the future. It means that we must think in terms of "big" geology so that we may be assured of "big" results.

In order to reduce this discussion to more concrete terms and to everyday experience, two types of geological concepts or principles are presented to show the kind and the scale of thinking that seems to be called for in an attempt to formulate a better idea of the nature and the extent of the undiscovered reserves of petroleum in the United States.

The first of these principles has to do with updip wedge belts of porosity in reservoir rocks and the second has to do with the layers of geology which are separated by unconformities. They may be considered as principles bearing on the occurrence of oil provinces, both discovered and undiscovered, and it is hoped that an understanding of them will enlarge and clarify your concepts of the occurrence of oil as they have mine.

Wedge Belts of Porosity

From Pennsylvania to California and from the Ordovician to the Tertiary, we find that oil province after oil province is located in close association with the updip wedging out of the porosity in the reservoir rock. This association is not coincidental nor occasional (Fig. 2), but is a principle which is fundamental to many or probably most of the oil provinces of the United States. The implications of such a philosophy are far-reaching.

These wedge belts of porosity include the Oriskany and other Devonian and the Mississippian sands in the Appalachian area; the Clinton sand and Trenton lime pays of Ohio; the "Corniferous" production flanking the Cincinnati arch; the Chester production in Illinois; the Cromwell and Wilcox production of the Seminole area and the Simpson, Bartlesville and Burbank production of northeastern Oklahoma; the Woodbine production of East Texas; Pennsylvanian sands in North Texas and several pays in the Lerado district, the reef and sand belt pools of the Permian basin; the Etchegoin in the Midway-Sunset province, the Eocene and Miocene production in the Coalinga area and much of the east side production in the San Joaquin Valley of California and many other areas (Fig. 2).

Fig. 2, Right: Showing petroleum provinces which have in their early history an updip wedging out of porosity in the reservoir rock

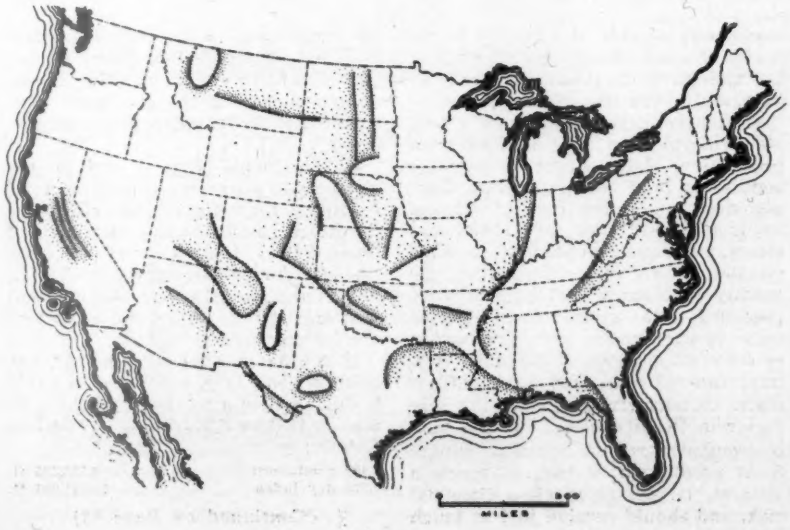


Fig. 3, below: Showing over 10,000 miles of well-known, essentially unexplored, updip wedge belts of porosity

Application

The application of the principle of wedge belts is simple. If you accept in your thinking an updip wedge edge of porosity in the reservoir rock, whatever the cause, as a fundamental prerequisite to the formation of many or most oil provinces, then you have **immediately** expanded your concept of the undiscovered petroleum reserves of the United States almost without limit. This is because there are thousands of miles of buried, updip, wedge belts of porosity, in rocks which are known to produce oil and gas elsewhere, and yet which are today only partly explored or com-

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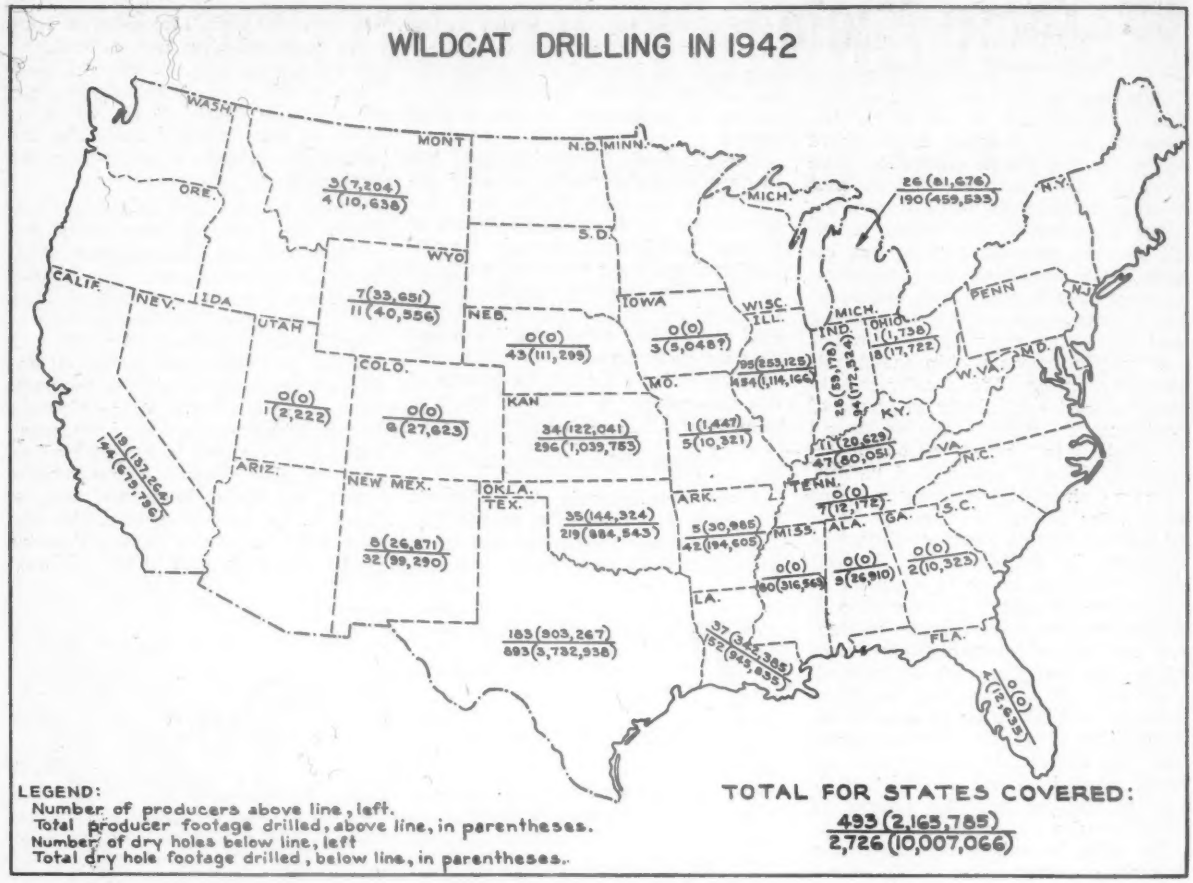

WILDCAT DRILLING IN 1942

by Frederic H. Lahee*

THIS paper reviews data on wildcat drilling for the eighth consecutive year.† The states from which information was available are indicated in the above map (Fig. 1).

We have continued to use the definition of a wildcat as a hole drilled completely outside the known boundaries of pools already developed, and far enough from producing areas to be essentially a test of new possibilities. Generally speaking, such a hole would be at least 2 or 3 miles from production; but, where subsurface conditions may change within short distances, as in the case of lensing sands and salt-dome structures, and where, consequently, predictions based on the known may turn out to be greatly in error, a test hole may be regarded as a wildcat even if it is only ½ or ¾ mile from production or from an abandoned dry hole. It is important to note that this does not make distance from a pool the sole factor in the definition. Often a hole to be drilled within less than a mile from production is just as much a wildcat, is just as much a financial risk, and should receive just as much encouragement in the search for new reserves, as a hole 2 or 3 miles from production. In every case the degree of uncertainty of the geological conditions should be taken into consideration.

On the maps (Figs. 1 and 2), the numbers in parentheses indicate total footage drilled; figures preceding parentheses indicate the number of holes drilled; figures above the cross line are for producing wells, that is, oil, oil and gas, distillate and gas, and gas; and figures below the cross line are for dry holes.

In the states covered in this review, as shown in Fig. 1, and listed in Table 1, during 1942 a total of 12,172,851 ft. was drilled in 3,219 holes, divided as follows:

493 producers	2,165,785 ft.
2,726 dry holes	10,007,066 ft.

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*Chief geologist, Sun Oil Co. This paper is published by permission of the American Association of Petroleum Geologists and will be printed in full in a later edition of the Bulletin.

†A.A.P.G. Bulletin, Vol. 21, pp. 1079-82; Vol. 22, pp. 645-48, 1231-35, 1236; Vol. 23, pp. 789-94; Vol. 24, pp. 953-58; Vol. 25, pp. 997-1003, 1938, 1939; and Vol. 26, pp. 969-982.

The writer acknowledges with thanks the kind assistance and cooperation of the following gentlemen in compiling data for this summary: A. P. Allison, A. H. Bell, A. S. Berger, K. E. Born, N. Burnett, D. H. Cardwell, George V. Cohee, R. J. Cullen, M. H. Funk, G. C. Gester, M. D. Hubley, E. A. Koester, C. S. Lavington, G. D. Lindberg, A. M. Lloyd, Graham B. Moody, D. J. Munroe, Jack Parker, C. H. Row, G. C. Sleight, L. C. Smith, and E. B. Wilson.

Some Factors Influencing Declining Rate of Crude-Oil Discoveries

*by L. F. McCollum**

THE decline in crude-oil discoveries has been the topic of discussion by the producing branch of the oil industry for the past several months. The general decline in discoveries which has obtained from 1935 through 1942, is viewed as a hazard to this nation's supply of crude oil and products. This subject is of prime importance to the geologists who represent the finding branch of the American petroleum industry. Upon our shoulders rests the responsibility of keeping the American nation supplied with ample crude-oil reserves to meet the necessary war requirements and essential civilian needs.

*Vice president, Standard Oil Co. (New Jersey) foreign producing companies. This paper is published with permission of the American Association of Petroleum Geologists and will be published in full in an early number of association's bulletin.

Recent estimates released by the PAW of crude-oil production required to meet the war needs and to supply essential civilian uses for the year 1943 are slightly less than 4,000,000 bbl. daily, with a peak production of perhaps 4,200,000 to 4,600,000 bbl. daily during the last quarter of 1943. With the anticipated production decline in the older producing areas, the present shut-in capacity to produce in some of the newer areas will be taxed to meet the required production without physical waste.

In the upper left-hand corner of Chart 1 are shown the volume of discoveries of crude-oil reserves, by years (1900-1942, inclusive) in the Mid-Continent-Rocky Mountain-Gulf Coast region of the United States, which comprises PAW Production Districts 2, 3 and 4. Revisions in estimates of discoveries have been credited or charged as the case may be to the year in which the discovery was made. This chart is not new, but is presented to support the statement made earlier that discoveries have declined over the past several years. Discoveries were approximately the same in 1942 (375,000,000 bbl.) as in 1931-33, the "depression" years. This figure compares to discoveries of 655,000,000 bbl. in 1941 and

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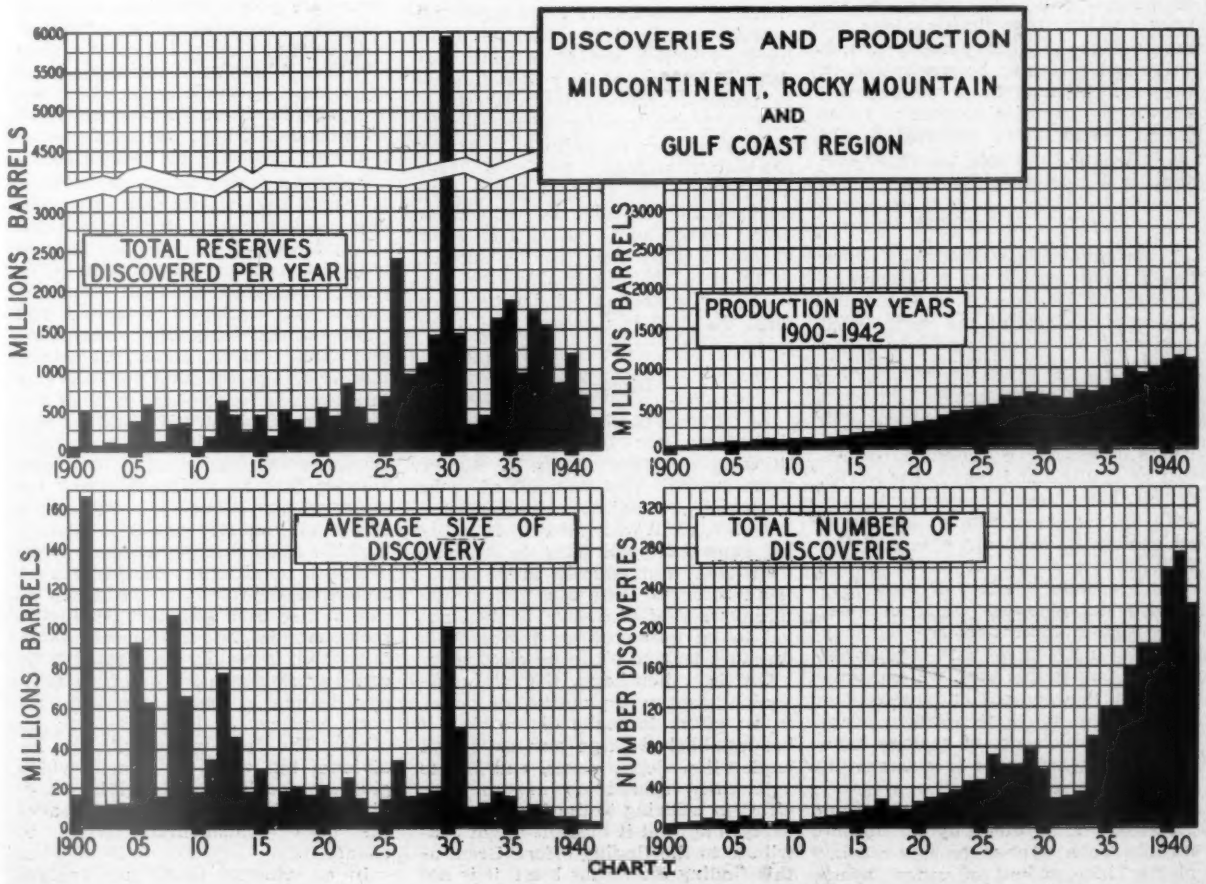


CHART I

Discovery Thinking

(Continued from Page 39)

pletely unexplored. A wedge belt is the clue to a province whereas a local fold is the clue to a pool.

Fig. 3 shows upwards of 10,000 miles of such wedge belts remaining to be explored. Fundamentally they represent the same type of geology which has in the past produced half a billion barrels of oil in the dolomite wedge belt of the Trenton formation of Indiana and Ohio; the same kind of geology which has and will produce 4 billion or more barrels of oil in the 60-mile porosity wedge known as the East Texas field; or which has produced over a billion barrels of oil along the wedge known as the Midway-Sunset district of California. The evidence for these unexplored wedges is almost entirely in the geologic literature and they are each well known to most geologists. In some instances the evidence is largely the result of surface mapping, in others it is the result of a few test wells, and in still others it is the result of various combinations of well-known surface and subsurface data. If the confidential data in the hands of the oil companies were available, it is probable that as many more miles of unexplored wedge belts of porosity would be known as are known today. If to that is added the new wedge belts of porosity which will most certainly be discovered in the exploration of those wedges now known, the ultimate number of miles which remain to be explored should be sufficient to satisfy the most pessimistic of geologists for many years.

Layers of Geology

A second principle of geology which has a wide application to petroleum geology is the concept of successive layers of geology in the earth, each separated by an unconformity. They are present in most of the sedimentary regions of the United States and will probably be found to prevail the world over. The discovery of these layers of geology is generally the result of drilling and many discoveries of oil have been contemporaneous with discoveries of totally unsuspected geology as well. In a few of the well-developed oil areas, a rather complete understanding of these layers can be obtained while in most other regions, indications are that they will be discovered with additional drilling but at this time we can only guess at their extent and nature.

Typical of the better-known areas where several layers of geology have been discovered is the area shown in Fig. 4.

In all instances, each layer is separated from the other by an unconformity; each layer of geology is completely independent of other layers above and below; there is no clue in the upper layer of either the existence or the character of the next layer below; and each layer has its own oil and gas geology, completely independent from each of the other layers.

It is in this last characteristic that we particularly find application to the future discoveries of petroleum, for it means that no sedimentary area can be considered as explored until many test wells have been drilled through all of the layers of geology down to the basement rocks. As a matter of fact, every sedimentary region in the United States has unknown and unexplored geology waiting to be drilled. It is probable that there is a volume of undiscovered and therefore unknown and unexplored geology equal to that which is already explored and it is inconceivable that these undiscovered layers will not some day be translated into equally large volumes of oil and gas. The infinite complexity and at the same time the infinite opportunity in the petroleum geology of any locality becomes apparent when we remember that each layer has its own wedge belts of porosity, its own facies and lithologic changes, its own structural history, and its own oil and gas geology.

This concept as a part of one's thinking immediately gives hope and promise to countless square miles of territory which are at present condemned because of their monotonously uniform and uninteresting structure and stratigraphy when considered from the viewpoint of orthodox petroleum geology. As in a layer cake, where the sweetest layer may be deep in the cake, so with these layers of geology, the richest layer at any locality may be the second, or third or fifth layer from the top, with no indication of its presence until the drill has crossed the overlying unconformity.

Discovery

An attempt has been made to show that from two lines of geological thinking we have reason to believe there are still vast volumes of rocks in which geological conditions are known to exist which may reasonably be expected eventually to become translated into equally large petroleum reserves. The question of the failing rate of discovery is then not yet to be answered by saying it is due to a lack of oil to be discovered.

On the other hand, the oil industry has spent vast quantities of money in an effort to make discoveries, it has established large and expensive exploration departments, and it has apparently spared no expense nor effort in utilizing to the fullest extent everything that it thought might contribute to the finding effort. Great as this finding effort has been, it is not enough to do the job. Some think that an increase in the price of oil, a subsidy to the wildcatter, or some other form of increased advantage to those who are charged with discovery will result in the necessary increase in reserves. While it seems obvious that a prerequisite to any successful discovery program on a national scale is a price which will provide enough incentive to take the necessary risks, our particular concern, as petroleum geologists, is to increase discovery and decrease risk under whatever economy prevails.

It is often said that what the oil industry really needs is a new exploration tool, like the fisherman needs some new tackle. But like the fisherman analogy, when it is remembered that the new fishing tackle is generally designed to catch the eye of the fisherman and not necessarily the eye of the fish, it gives cause to wonder whether or not some of the new gadgets or devices continually coming into the discovery picture may be more of the nature to catch the eye of the contour-minded executive rather than the elusive oil field which it is hoped to find.

Whether the economic framework within which we must operate is good or bad, we have an unused tool as old as geology itself. It is simply—more geology. Not only should such a procedure prove effective, but it is relatively inexpensive as compared with current exploration costs, and in addition, it has the distinct advantage of being something with which we are now familiar. We can start off with it now without waiting for some unknown device to be discovered.

Before exploring the matter further, it might be well to point out that more geology means either more geologists, better pay for geology as such with a consequent better geology, or both. The young geologist, when he starts out, equipped with his full quota of ambition, energy, enthusiasm, and a desire to do things, looks about him and observes that the big pay jobs are not for geology as such but for office, administrative, and production jobs in which geology merely furnishes the background. Is it any wonder that he gradually turns his attention and energy to the business of the oil industry and lets geology lag? He finds there is a salary level, different in different companies, yet nevertheless present, above which he cannot rise as a geologist dealing in rocks, samples, and field observations, but which is readily penetrated if he can do administrative or office geology dealing in maps, appraisals, reports, surveys, and data secured by others. The fault is not with the individual but with the system which gives so much more tangible recognition to the superficial and leaves the more fundamental factors to chance.

In an attempt to further analyze

the modern discovery process, a survey was made of the number of seismograph units as compared to the number of geologists in 17 representative oil company exploration departments. The number of geologists per seismograph ranges from three to nine. If an average figure of $10,000 per month be used as the cost of a seismograph and $500 per month be used as the average cost of a geologist, which includes office help, draftsmen, and filing clerks attached to the geological department, it is seen that the money spent on geologists ranges from 15 to 45 per cent of the amount spent on seismic surveying. The average is 30 per cent.

As has been pointed out, the modern geological department spends but a relatively small part of its time in searching for new oil fields and by far the major effort—probably fully 90 per cent—on routine connected with production and development problems in fields which have already been discovered, and on routine clerical and administrative work. The amount of money spent directly by the geological department in search for new oil and gas fields—in what might be called "discovery thinking"—is thus only an average of one-tenth of the 30 per cent or 3 per cent of the amount spent by the geophysical department, when these two departments are considered separately.

Stated still differently, all of the money spent on seismic surveying, plus most of that spent on the part of geology devoted to discovery, goes into a search for structures, in which it is hoped oil will be found. When one remembers that at least a third and probably a half of the past production and present reserves are located primarily as a result of some stratigraphic variation or anomaly of sedimentation, and in addition, he has been shown, even most regions where the individual oil pools are structural, the province as a whole is fundamentally related to major stratigraphic variations called wedge belts of porosity, it is seen that the big majority of all our past discoveries have in them a stratigraphic factor, either directly or indirectly responsible for the accumulation of oil. Since most of the 3 per cent of the strictly geological time and thought spent on discovery is concerned chiefly with structural studies, we might truthfully say that less than 1 per cent of our total discovery effort is devoted to the kind of geology which is known to be responsible, either wholly or in part, for most of our oil. It does not make good sense.

Wedge Belts of Porosity and Layers of Geology

If you agree that wedge belts of porosity are commonly a fundamental prerequisite of an oil province and that successive layers of unknown geology underlie much of the sedimentary region of the United States, then you must reach the conclusion that the only known way of reducing these conditions to practical application is through a strictly geological approach. Such an approach means the preparation and study of facies maps, lithologic maps, isopach maps, paleogeographic maps, paleogeologic maps, quantitative and qualitative sedimentation studies, and detailed stratigraphic analyses of every porous sedimentary rock unit in the United States and eventually in the world. It means a resolving of the great mass of geophysical data into stratigraphy and sedimentology as well as into structural geology. The basis for this work is a restudy, first, of all surface outcrops, most of which will have to be reexamined from a stratigraphic and sedimentational viewpoint as well as structurally; and second, a restudy of the detailed subsurface data now in the files and laboratories of the oil industry in the form of well cuttings, cores, electric logs, porosity and permeability measurements, water, oil and gas content, geophysical and geochemical data, and anything which will throw light on the location of a wedge edge of porosity or the crossing of an unconformity into new and unexplored geological conditions.

When you accept into your geological thinking the philosophy of wedge belts of porosity and layers of geology, you must at the same time agree that there remains many times as much fundamental commercial geology to be done as has been done in all of our past geological experience. Most of the information in the unexplored regions is and always will be fragmentary and inconclusive, and it is for this reason more than any other that experienced, broadly trained, and speculative-minded men will have to be developed. Moreover, this kind of geology is not the type that can ordinarily be done as a casual task between conferences, but it is the kind that will require hours, months and years of the most careful study, thoughtful analysis, and imagination without end.

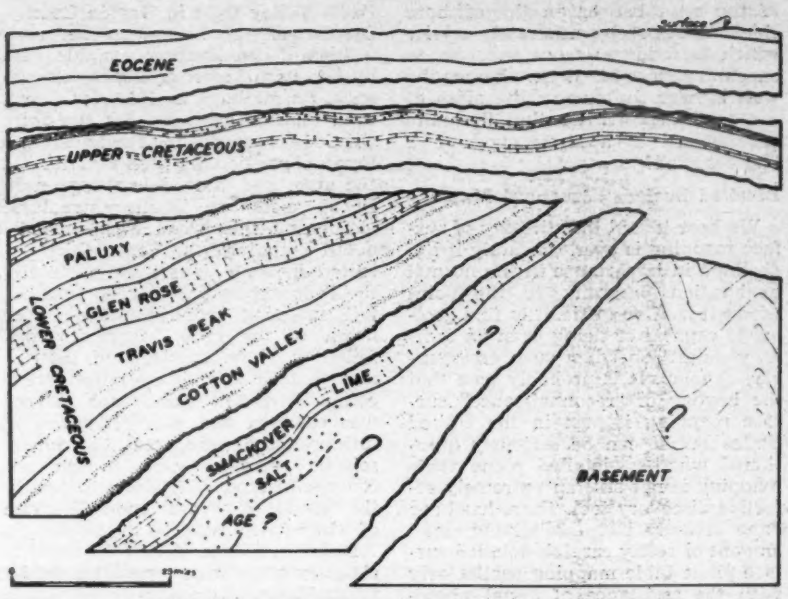


Fig. 4: Northern Louisiana and southern Arkansas is another area in which numerous layers of geology are found superimposed on each other

Limestone Reef Fields

There are enough oil pools which are now known to produce from limestone reefs or from reeflike deposits to justify the conclusion that there are a great many more yet to be discovered. Every company might well have an expert on "reef" production —a person of broad geological experience, skilled in the interpretation of geological conditions from well cuttings, able to visualize subsurface conditions and geological environments, and one who would devote his entire time over a period of years to this problem. The problem of reef production is fundamentally geological and the cost of such work in terms of the discovery possibilities is insignificant.

Here is a field of study which most certainly will yield results if attacked scientifically. Such attack would be purely geological in nature and probably largely in the field of detailed sedimentology. It would depend in a large measure on a thorough understanding of all the phenomena of sand deposition along varying sea coasts, on the ecology of such regions, and on the ability to identify sand forms accurately with small amounts of data. Is it not probable that detailed sedimentation studies will enable one skilled in lensing sands to tell whether the test well is on the lagoonal side

of the sand bar or on the offshore side? And thereby accurately advise which direction to move in order to encounter more sand? Or whether the well is near the end or the sides of the sand deposit? Or that the sand encountered is a stray sand or a blanket sand?

Detailed Surface Structural Mapping

We hear it said that the day of surface mapping is over. Certainly it has declined in importance in the normal exploration programs to the point where it is often difficult to find geologists capable of doing even an ordinary detail job when such emergencies develop. It is probably true that the heyday of "reconnaissance" surface mapping is past in the United States but it can be seriously questioned whether detailed plane table mapping is not still an extremely effective discovery tool. There has been done actually but a relatively small amount of really careful, detailed surface plane table mapping particularly with the assistance of aerial photographs. Over and over again we hear of geophysical or subsurface prospects which it is later remembered or determined underlie surface anomalies, and we likewise hear of geophysical and subsurface failures which underlie readily workable yet perfectly normal surface structures. The value of detailed surface geological mapping is too often recognized after it is too late rather than as a primary discovery technique.

Two examples of recent discoveries resulting from surface mapping show that such methods are by no means ready to be put on the shelf. The first is the discovery of the East Watchorn pool in Township 23n, Range 3e, Pawnee County, Oklahoma, by the Alma Oil Co. The second example of discovery resulting from surface mapping is that of the Hawkins field in Wood County, northeastern Texas.

These are but two examples of many that might be presented to show that there is still a place for surface mapping; that it leads to oil and gas discovery; and that it is not a kind of work to leave entirely to the young geologist, but that it can be most effectively done by men of experience — which means such men must go out to where the outcrops are located. Surface geological mapping today should consist of more attention than heretofore to the sedimentary variations, facies changes, and stratigrapic studies which will bring it into more practical relation to subsurface studies, wedge belts of porosity, and problems related to overlaps, unconformities, and local and regional geologic history. Moreover, when it is remembered that 8 or 10 experienced plane-table parties can be kept continuously in the field for the equivalent cost of one seismograph crew, the cost in relation to oil discovery is insignificant.

The story of the discovery of the Pauls Valley field in Garvin County, Oklahoma, well illustrates the possibilities of coordinating variable data by one with broad geological experience. As far back as 1928, Ira Cram, then district geologist for the Pure Oil Co., recognized the fundamentally favorable regionally high structure of the area, and started working on it. In an effort to localize structural closure on this broad arch, surface-detail mapping was done which resulted in some ideas, but generally the beds exposed were such that detail mapping was impossible over much of the area. Magnetic work failed to show anything of interest and, in 1933, seismic operations were commenced. The subsurface geology was complex and the difficulties of interpretation were great, but during seismic reconnaissance enough encouragement was obtained to justify the leasing of several anomalies, one of which later included the field.

Between 1934 and 1937 13 Ordovician dry holes were completed in the Pauls Valley district, none of which offered any definite promise of future discovery. Cram, however, reexamined all of the seismic data in the light of the detailed sample information revealed by these dry holes, coordinated the information, and as a result reworked the geology of the entire area. From this restudy, the geologic history was worked out with fair accuracy, additional detailed seismic work performed, and relationships were established which had been indefinite or merely suggested.

Geological Research

The time is fast approaching when some extensive fundamental research is called for in petroleum geology. Most of the research laboratories of the oil companies are devoted chiefly to studies of refined products; new uses for petroleum; development of geophysical instruments; and development of engineering and production principles and techniques. In these modern research laboratories, as well as in the exploration departments, we find the main efforts are directed chiefly toward the improved utilization of petroleum which is already discovered or produced rather than toward the more fundamental problem of discovering new supplies to replace those that are now being consumed.

PAUL WEAVER
Vice President, A.A.P.G.

If there is any doubt as to the ability of the industry to maintain a supply of petroleum through the years ahead — and we all realize there is such a doubt — then through some means or other research on many of the fundamental questions concerning the occurrence of petroleum cannot start too soon. Most of our oil provinces have been discovered contrary to the orthodox geological opinion prevailing at the time, which is pretty good evidence that our fundamental thinking is not sound. Other industries, which use petroleum products, are developing new uses through research, but our thinking has been standing still on the problem of discovering the supplies these increased demands call for.

An industry that spends a quarter of a billion dollars or more each year on exploration can well afford to set aside a small percentage of this money in an attempt to make its effort more effective, if not to save the entire situation. This is in fact a public responsibility.

In conclusion, what has been said resolves into the simple statement that the oil industry is bypassing an important discovery tool. It has attempted to mechanize, routinize and standardize what DeGolyer has so aptly termed the "art of discovery"— an inherently individualized and infinitely variable process—and the job is not being done. The proposal is to return to geology as such, but on a much higher scientific level than heretofore. As a discovery tool, there is enough geology now rusting away in the sheds of our filing cabinets and in the background of our thinking to cultivate a really substantial and continuous crop of new oil fields. We have, in the form of more geological observation, more geological reasoning, and more geological understanding, tools that will take hold as our present methods let go, and they are fully able to carry, not only the geologist but the oil industry itself, to new levels of achievement. Moreover, the United States is the great proving ground for exploration ideas and the problems we have here and the solutions we get become the guide to discovery throughout the world. If we are but encouraged and permitted to exercise our latent abilities we can do much toward lifting the clouds of doubt and uncertainty concerning our oil supplies, which have settled round about us.

Declining Rate of Crude-Oil Discoveries

(Continued from Page 41)

1,185,000,000 bbl. in 1940. The discovery of approximately 6,000,000,000 bbl. of oil in 1930, the year of discovery of the East Texas field, stands out strikingly and needs no comment. It is the decline in later years that interests us most at the moment, and to which we will devote most of our discussion.

In the upper right-hand corner of Chart 1, production is plotted by years from 1900 to 1942, showing a rather constant increase in production to a peak in 1941 or 1,139,000,000 bbl. The trend in production during recent years is inverse to that of discoveries, giving rise to the concern that is felt today by the industry that we may fail to meet without wasteful production practices our future demand for crude oil. In the lower left-hand corner of Chart 1 you will see the average size of discoveries by years from 1900 to 1942. The peaks in the years 1901, 1905-6, 1908-9, 1912, and 1930 stand out strikingly, as do also the scarcity of peaks in later years and the decline in average size of discoveries since 1930.

Number Increasing

In contrast to the volumetric decline in discoveries during the past 3 to 7 years, and the decline in the average size of discoveries for the past 10 or 12 years is the total number of discoveries shown in the graph in the lower right-hand corner of Chart 1. With the exception of the years 1931-33, there has been a gradual increase in the number of discoveries from 1900 to 1942, with the peak number of 275 discoveries being attained in 1941. Despite this increase in the number of discoveries, graphs to the left on Chart 1 indicate that the total volume of oil discovered annually has declined. This raises the doubt that our prospecting territory still holds hidden fields of large magnitude compared to such fields as East Texas, Oklahoma City, Yates, Conroe, Salem, Hobbs, and others.

The decline in total completions for this area from 23,148 wells in 1941 to 12,929 wells in 1942 (44 per cent) is striking. This decline is probably the direct result of federal spacing regulations and the shortage of materials —the shortage of materials creating the necessity for federal spacing regulations. The decline in dry holes drilled from 6,345 in 1941 to 4,967 in 1942, and the decline in wildcat completions of from 3,255 in 1941 to 2,956 in 1942, may also be attributed at least partially to the shortage of materials.

It is obvious, at least during 1942, that the shortage of materials influenced crude-oil discoveries. With a continuing shortage of necessary materials and equipment, the rate of discovery may decline further. The search for new prospects and also the drilling of additional wildcat wells will be influenced by the material situation. This problem is one which the industry must solve, and is receiving a great deal of attention. Since the matter is in capable hands, it is hoped that sufficient materials and equipment will be available during 1943 for the drilling of the necessary number of wildcats and to permit the desired amount of other exploratory work.

Manpower Shortage

The shortage of manpower in the search for new discoveries is becoming acute. A number of manpower surveys are in the process of being compiled. The Lovejoy committee on manpower, in a preliminary report to the PIWC, states that the average loss of personnel by the petroleum industry to the armed forces runs approximately 15 per cent, with the experience of individual companies varying from 5 to 35 per cent.

The technical staffs, the leasing staffs, and other members of the finding staffs of the operators, both small and large, have been severely depleted. Geologists and geophysicists, as well as others connected with the finding branch of the producing industry, have answered the call to the colors unhesitatingly. Of the total membership of the A.A.P.G., 14 per cent are either in the armed forces or in government-civilian service and hence are not available for exploratory work during 1943. Final figures on the loss of geophysical personnel have not been completed by the S.E.G. Preliminary figures indicate that 30 per cent of the geophysical personnel employed at the time of the Pearl Harbor attack have now gone into the services. Drilling crews for wildcat drilling purposes are increasingly harder to obtain and an acute shortage in drilling personnel threatens. Other members of the finding branch of the producing industry are occupied in work either directly or indirectly connected with the war, and hence are not fully available for exploratory work. There has also been a severe loss of other personnel engaged in the general effort of discovering new reserves.

Perhaps in the immediate present the importance of the manpower problem overshadows that of the material problem. **In order to find the oil which may be necessary in the future, there should be an immediate acceleration in the amount of geological and geophysical effort and the men required for this acceleration should be made available.**

No discussion of the principal factors influencing discovery rates would be complete without examining the effect or influence of prices. Chart 2 shows by 3-year running averages the relationship between average crude-oil price, dry holes drilled, and discoveries from the entire United States for the period 1900 to 1942. This chart shows a generally direct

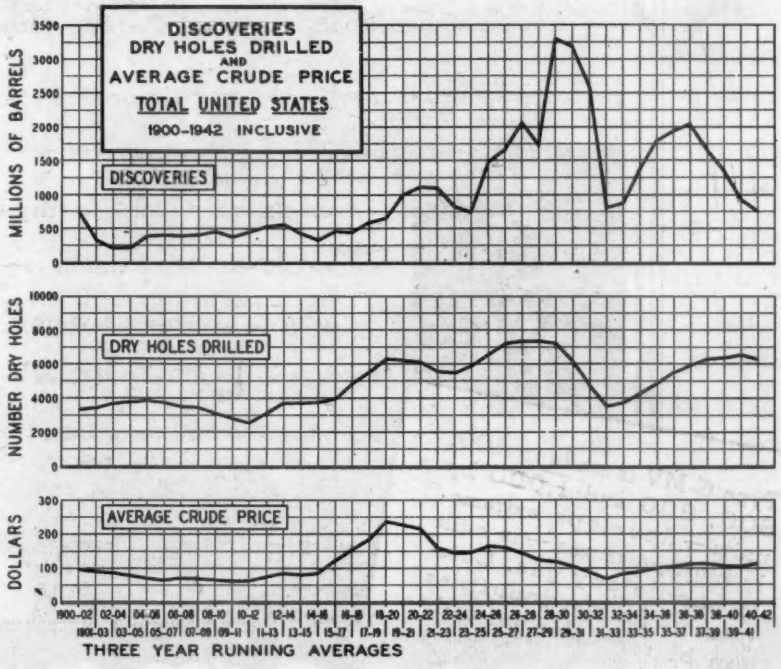
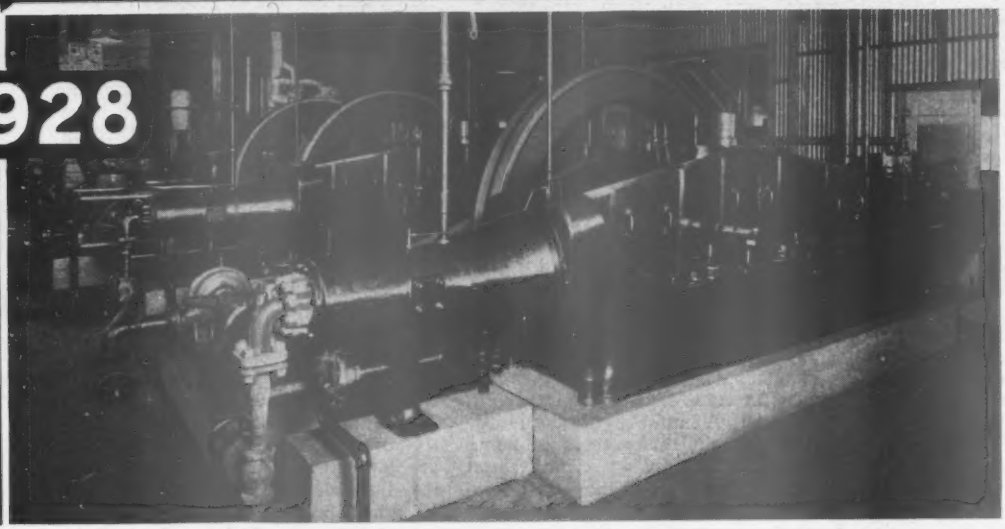


Chart 2

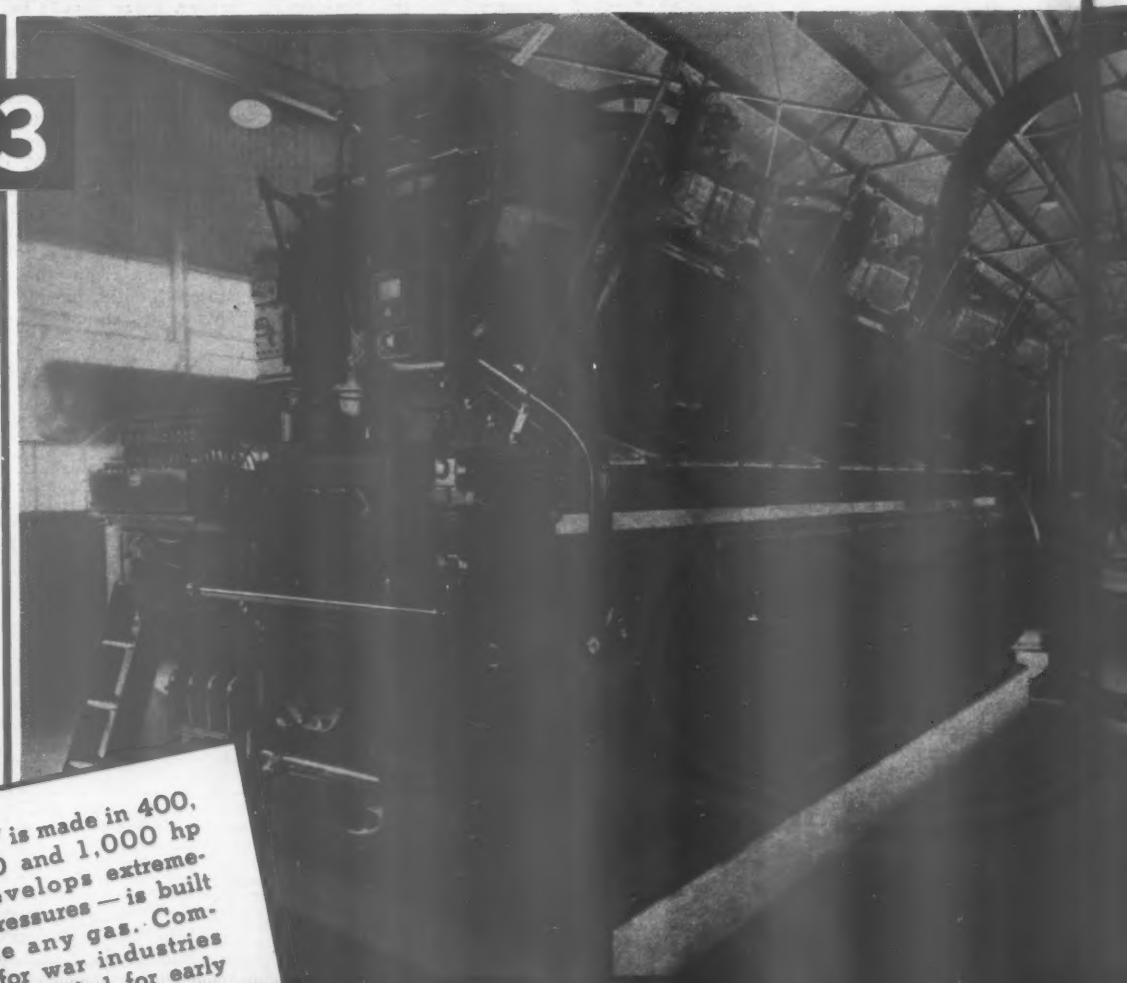
15 YEARS OF

1928



The 1928 helium installation. Main compressor plant at Dexter, showing 3 Cooper gas engines driving 4 - ½" diameter compressors.

1943



Type G-MV is made in 400, 600, 800 and 1,000 hp units — develops extremely high pressures — is built to handle any gas. Compressors for war industries can be scheduled for early shipment.

Compressor

New York Washington Bradford, Pa. Parkersburg, W. Va. Gloucester, Mass

PROGRESS IN PRODUCING HELIUM

SPECTACULAR "have not" of the Axis, rare helium is no longer rare . . . in America.

War has brought repeated huge increases in helium manufacture . . . for Navy blimps, for barrage balloons, for other lighter-than-air craft. The government is in the expansion program with another helium plant installation of Cooper-Bessemer compressors — eight Type G-MV's.

It was only 1928 when the first commercial helium plant in the world was opened at Dexter, Kans. Compressor power was supplied by the then ultra-modern Cooper gas engine.

Helium gas hasn't changed in 15 years. But compressors to produce it are as radically improved as their appearance suggests. Today the Cooper-Bessemer G-MV, driven by a powerful V-angle engine, is the ultimate in compressor power. Just as rugged as the old horizontal, the G-MV is substantially lighter in weight per horsepower. It is just as dependable. It is even more efficient, more compact, more economical to operate.

COOPER BESSEMER EST 1833

r by **Cooper-Bessemer**

MOUNT VERNON, OHIO AND GROVE CITY, PENNA.

Houston, Dallas, Greggton, Pampa and Odessa, Texas Tulsa Shreveport St. Louis Los Angeles Seattle, Wash.

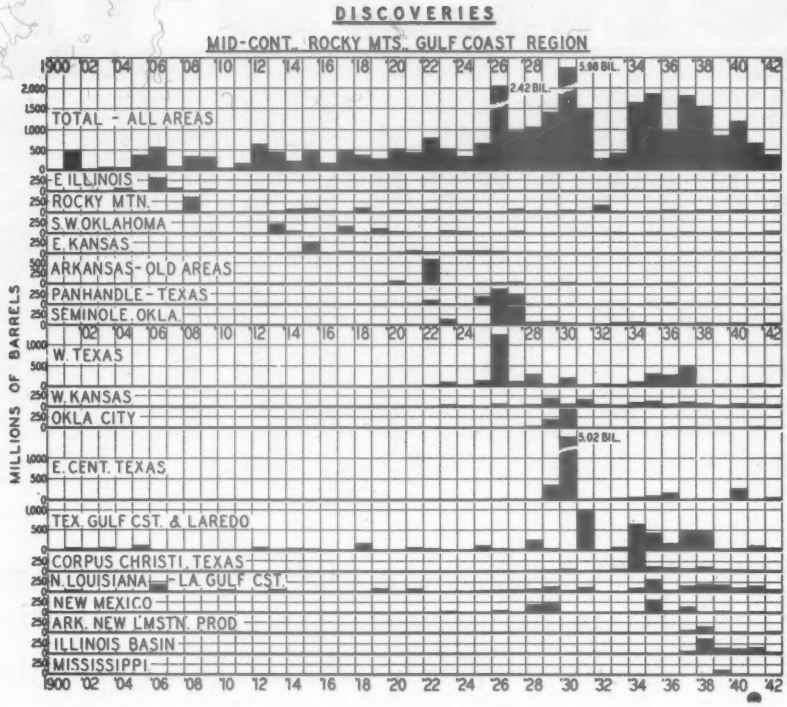


Chart 3

relationship between the average crude price, dry holes drilled (a measure of finding effort), and discoveries, but in recent years, with which we are principally concerned, this direct relationship fails to maintain itself.

Dry Holes and Prices

The search for new reserves as measured by the dry holes drilled has been generally upward from 1933 through 1941, with a decline in dry holes completed of 7,128 in 1941 to 5,500 (23 per cent) in 1942. From the year 1934 through 1942, the price of crude oil has remained fairly constant, fluctuating from a low of $0.96 per barrel in 1935 to $1.17 per barrel during 1942. Contrasted, however, to the somewhat uniform crude price from 1934 through 1942, and contrasted to the increased number of dry holes drilled as a measure of exploratory effort during the same period, is the general decline in reserves from 1937 through 1942. Dry holes drilled increased every year from 1933 through 1941, except for a slight decrease in the year 1938. Discoveries, however, declined from approximately 2,075,000,000 bbl. in 1937 to 420,000,000 bbl. in 1942, with declines occurring each year except in 1940.

This lack of correlation between discoveries, the number of dry holes drilled and the price of crude oil during the last few years requires further examination. The direct relationships between price, search, and discoveries prior to this period, leads to the possible conclusion that other factors are operative today that were not present prior to this time. It would appear from this chart that the major factor influencing this decline in discovery rate is neither the material shortage, the manpower shortage, nor the price of crude oil. It is probably worthwhile, then, to look further in search of other factors that are influencing the declining discovery rate for the past several years.

Chart 1, shown earlier, indicates that the total number of discoveries by years from 1900-42, and particularly during the last few years, with the exception of the year 1942, have increased tremendously, as a matter of fact, increasing from approximately 30 discoveries in number in 1931 to 275 discoveries in 1941. During approximately the same period, with the exception of a few minor fluctuations, the average size of discoveries has declined from 18,000,000 bbl. in 1934 to less than 2,000,000 in 1942.

Upon examining the relationship between the discovery rate in the entire Mid-Continent-Rocky Mountin-Gulf Coast region, and the effect of the opening of new geological or prospective provinces within this area, one is impressed with the importance that new prospecting territories have played in maintaining the discovery rate. A similar examination of the relationship between discovery rate and the exploration methods responsible for finding oil pools in this region indicates the importance which new finding tools have played in maintaining finding rates. A thorough study of the influence of these two factors on discovery rates during the past 40 years and a critical examination of the declining discovery rate during the past 3 to 7 years, indicate that "the old field from which we have been raising our new crop of oil pools is becoming increasingly unproductive as a result of being constantly recultivated," and that the implements which we have used to find oil in these fields "are becoming increasingly dull and ineffective."

New Areas

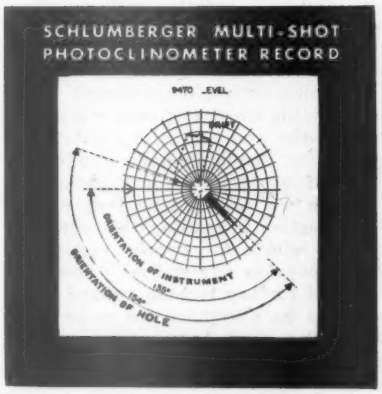
Chart 3 shows the relationship between the discovery rate in the Mid-Continent-Rocky Mountain-Gulf Coast region and the opening of new geological producing areas within this region. As a new area is proved, exploration effort increases and the finding success rapidly builds up to a peak. Discoveries later run their source, after the new areas have been combed, and the discovery rate then descends. Chart 3 at the top shows discoveries in the Mid-Continent-Rocky Mountain-Gulf Coast region by years from 1900 to 1942. Beneath this is shown discoveries by years in certain geological producing areas for the same period. Note the direct relationship or influence between peak years of discoveries by geological provinces and the discoveries for the region as a whole. Note the influence of Arkansas discoveries in 1922 on the total discoveries for the area under discussion. Also, note the influence of discoveries in the Panhandle of Texas, the Seminole area of Oklahoma, and the West Texas area in the years 1925, 1926 and 1927 on total discoveries for the Mid-Continent-Rocky Mountain-Gulf Coast region. Generally it may be seen from Chart 3 that **without the opening of new prospecting territory, discovery rates could not have been maintained.** Since the area of active search in the Mid-Continent-Rocky Mountain-Gulf Coast region has not been expanded materially in recent years, the decline in the rate of discovery may be due to the exhaustion of our hunting grounds. In other words, "our finding field is becoming sterile from being constantly ploughed over."

The relationship between the volume of reserves discovered and the exploration method responsible for the discovery of oil pools in the Mid-Continent-Rocky Mountain-Gulf Coast region for the years 1900-42, inclusive, is illustrated on Chart 4. This chart also shows the number of discoveries by exploration methods. On the right-hand side of this chart at the top is the same graph shown in

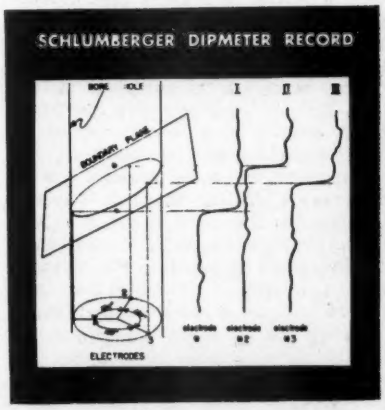
SCHLUMBERGER DIPMETER

QUICK, ACCURATE DETERMINATION OF DIRECTION AND VALUE OF FORMATION DIP

With the same high degree of accuracy that has distinguished Schlumberger Electric Well Logging, you may now determine formation dip and direction values. This new service combines two proven Schlumberger operations—electrical well logging and photoclinometer



directional surveys. The instruments are lowered into the hole on a standard Schlumberger cable, requiring only one trip in the well for the entire Dipmeter Survey. Simultaneous recordings are made of the drift and orientation of the well bore, the orientation of the instruments, and of 3 S.P. curves of the formation being investigated. Upon obtaining these data, the precise direction and magnitude of the formation dip can be easily determined with the aid of com-



puting apparatus development by Schlumberger.

The following figures briefly outline the operations involved in a Dipmeter Survey:

Schlumberger Multi-shot Photoclinometer Record

This record, which is obtained at the same time the Dipmeter is lowered into the hole, registers the drift angle of the hole, direction of drift, and orientation of the photoclinometer instrument.

Schlumberger Dipmeter Record

The Dipmeter is an adaptation of Schlumberger electrical logging. Three electrodes spaced 120 degrees apart in a plane perpendicular to the axis of the instrument and located on a circle of a known diameter corresponding to the diameter of the hole, record three S.P. logs along three oriented generatrices in the hole. The shift in depths, as revealed by the three curves, may be translated into dip value.

Schlumberger Dip Computing Instrument

This unique apparatus eliminates the mathematical computation of formation dip values. Utilizing an adjustable plane table, compass, vernier and adjustable upright arms which are perpendicular to the plane, it reconstructs, mechanically, the various operations performed by the Dipmeter in the hole and the direction and value of the formation dip is read directly from it.

SCHLUMBERGER

Pioneers of Electrical Well Logging

the lower right-hand corner of Chart 1, which brings out the increase in the number of discoveries over the past 40 years. Also, on the right-hand side of this chart, is shown the total number of discoveries by each exploration method for the same period. Generally, this shows that each method of exploration is still effective in so far as its ability to find prospects is concerned. On the left-hand side of Chart 4 is shown the amount of oil discovered annually from 1900 to 1942, inclusive. At the top of the chart there is again shown volume of discoveries, by years, for the period under discussion. Again, it should be pointed out that total discoveries have declined generally during the past 7 years.

Discovery Methods

Beneath the graph at the top in the left-hand corner of Chart 4 is shown the total oil discovered by years by the various finding methods. It is clear that there has been a rapid increase in the amount of oil discovered soon after the inception of each new method and that each method now is in a period of lessened effectiveness. It is also obvious that, **without the introduction of new finding methods, total discoveries would have been much smaller.**

Charts 3 and 4 clearly illustrate that **our finding tools are less effective today than at any time heretofore** from the standpoint of the volume of oil being found, **and further illustrate the extreme need for developing new prospective territory in the Mid-Continent-Rocky Mountain-Gulf Coast region if the discovery rate is to be maintained. These two factors have profoundly influenced the discovery rate over the past 3 to 7 years, and, in my judgment, have been major causes of its decline.**

Geologists and geophysicists should recognize the responsibility which they bear. We are the one most ca pable of either improving our known exploration methods or of discovering new discovery methods. It has been obvious to most of us for some time that the relative effectiveness of our exploration tools is decreasing. Recognizing this fact, we should exert our influence on those who look to us to find oil to provide us with ample materials, manpower, and money to sharpen our present tools and to devise new ones. Likewise, it is up to us to extend our search for oil to new provinces. We know that we cannot fertilize our old finding field and grow a new crop of oil pools. **We must move into new territory.** This will require carrying on exploratory activities in regions that heretofore have not received a great deal of our attention. It will be necessary to search for oil and drill wells in regions remote from our place of former activity, or from our operating headquarters. Our search should be more audacious and less cautious. Assuming that the same average size of discoveries during the last 3 years obtains for the next 5 years in the region being discussed, it will then be necessary to drill 5,100 wildcat wells annually, or 1.75 times the number of wildcats completed in 1942, to discover the oil we will produce annually.

The importance of the independent producer and the oil promoter in the finding effort of the industry cannot be overemphasized. There are many individual operators who do a large share of the wildcat drilling, and who often employ more geology in their operations than they themselves realize. The industry owes much of its success to these operators and everything possible should be done to encourage their continued operation and success.

Requirements

We must accept the responsibility for improving our discovery rate. The improvement of exploratory methods and the discovery of new methods may bring increased costs. Likewise, exploring for oil in new regions, some of which do not appear attractive, may result in increased costs. These facts should be honestly and courageously faced. If we are to succeed in our efforts to maintain our discovery rate, the necessary funds with which to carry on the needed search must be provided.

The finding branch of the producing industry may be required to initiate and carry out an aggressive research program, designed to discover new finding tools or to improve our present methods. Such investigations might go further into the possibility of new instruments based on chemical, physical, or electrical phenomena. Enlarged regional stratigraphy and structural studies are desirable. Cooperative effort in this regard should yield valuable results.

As geologists, we may content that the declining discovery rate is due to the material shortage, the manpower shortage or to inadequate crude-oil prices. **If we face the facts, however, I believe we must admit that more potent factors in causing this decline are our failure for nearly a decade now to develop any radically new or improved finding techniques and our insistence on ploughing the same old fields. We need better implements and new fields to use them in.**

The oil geologist's future is perhaps brighter today than ever before. Because of the need for exploration personnel, there will be a demand for his talents. The reward for qualified "explorationists" will be great. We are happiest when we have a job to do and are busy doing it. Upon our shoulders rests the responsibility for increasing our discovery rates. We may approach this task with confidence that the job can be done, and we will do it.

Acknowledgment

I wish to express my appreciation to members of the Carter Oil Co. staff for their assistance in assembling the statistical data and in preparing the charts; also, to these people and other associates for their helpful suggestions and constructive comments.

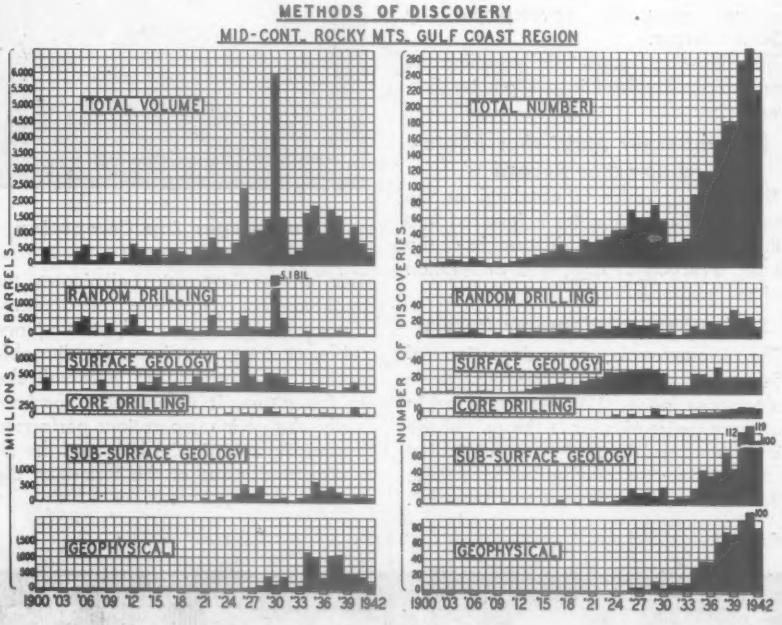


Chart 4

SOLDIERS OF SCIENCE

In Search of Vital Ammunition . . . Oil

Never in the history of oil has this product been more vital than now, for oil today is truly ammunition. Likewise, the assurance of ample reserves is of equal importance. To that end our geophysical crews, now busy locating these future reserves, are an army of supply for our fighting forces.

18 YEARS SEISMOGRAPH SERVICE
WITH NO DISSATISFIED CLIENTS

PETTY GEOPHYSICAL ENGINEERING CO. • San Antonio, Texas

Maintaining an Adequate Level of Geophysical Exploration

*by F. Goldstone**

AT the time of the Denver meeting last year, many geologists and geophysicists were frankly in doubt as to where their duty lay in the war effort. This year there should be much less uncertainty as we have been given a task on the home front which will tax our resources to the utmost. The task, to locate 4,500 wildcat wells so judiciously that neither steel nor manpower will be wasted in unjustified drilling. The facts which seem to make necessary this enormous wildcat-drilling program in the face of a national shortage of critical materials and manpower have been widely publicized in the trade journals, and I will only briefly recapitulate them.

In 1942 we consumed about 1 billion 385 million barrels of oil. PAW statisticians tell us that in this same period and at a conservative estimate, we found 317 million barrels of new oil in new fields; on the most liberal estimating basis, including new horizons in old fields, they are willing to raise the estimate to 801 million; one well-informed trade journal gives us a figure of 323 million barrels for new fields, and, finally, the A.P.I. places the figure at 260 million. Personally, I am inclined to accept the upper figure of 801 million given by PAW as being the most probable measure of oil found in new fields and horizons last year. However, estimating petroleum reserves has in the past proved itself to be a very inexact science and subject to influence by the philosophical basis of the computations; furthermore, we are not justified in equating discoveries made during any one year with exploration during that year since there is a lag of from months to years between exploration and drilling. There is, therefore, plenty of room for differences in individual opinion and statisticians can so present the figures as to support widely different contentions. Probably the safest course is to study the trend of estimates made periodically on the same basis. Published estimates which extend back a number of years suggest that the yearly discovery rate of new oil in new fields has been declining for the past 5 years at least. It is a reasonable assertion that some time in the not distant past consumption exceeded the finding rate of ultimately recoverable oil in new fields for the first time in our history as a major industry; whether this happened as recently as last year, or as long ago as 1939, is probably uncertain. What is more inportant, not only has the tide of discovery turned, but the ebb is now felt to be running very fast.

We are told that no prudent appraisal of the present reserve situation can tolerate a substantial decrease in available reserves, particularly in certain strategic localities, and that the additional oil which will become available by extensions to known pools is inadequate. Our mandate is to discover new fields, even at the expense of a program of wildcatting exceeding the lushest years, and it is one principal purpose of our annual meeting this year to lay plans for so doing.

Rating of Methods

What methods to use in locating the wildcats which will bring in these new pools is debatable. Dr. Lahee, in his helpful annual compilation of comparative ratios of discovery by various methods, gives geophysics first place with geology a good second, and wildcatting a very poor third. These ratings are on the basis of the number of successful wildcats located by various methods as against those which were dry. Were these statistics amplified and reanalyzed to disclose the barrels of oil discovered by the various methods, they would furnish a direct guide as to the best present course. Unfortunately, there does not seem to be a more recent study than that made by J. B. Eby, which extends only through 1938. Statistics taken from Dr. Lahee's tabulation suggest that wildcatting without geological or geophysical guidance was relatively unsuccessful, in that three times as many wells were drilled to discover each producer as was the case under technical guidance. If we go back a few more years and put our appraisal on the basis of barrels of oil found per well drilled, not forgetting East Texas, Slaughter, and several other large low-relief fields, then the wildcatter might, and I believe does, show up to much better advantage. Never the less, in planning an exploration program which must achieve a certain minimum objective with reasonable assurance of success, it would be foolhardy to count on the discovery of such reserves by promiscuous wildcatting since the outcome is so largely a matter of chance.

Need for Planning

Therefore, we must plan our exploration program along more predictable lines which will virtually assure the attainment of the minimum objective, and yet not preclude the spectacular results which in the past have so frequently rewarded those willing to take the maximum chances. Geophysics offers the best means, in most areas, of reducing structural uncertainties and so should figure prominently in the program. Let us now consider the prospects of the geophysical branch of exploration being able to maintain its high contribution to successful wildcatting.

In the first place, it is pertinent to review geophysical operations during the past year, both as regards scale and geographical distribution. My figures show that throughout 1942 an average of 225 seismograph crews and 50 gravity crews operated. There was also an assortment of "doodlebugs" which we will ignore for the purpose of this discussion. By far the greater part of these exploration facilities was concentrated in venerable areas of proven production. The backwoods of the presently unproductive areas attracted little exploration.

Thus, with what approaches an all-time high in scale of operation and a geographic and philosophic distribution of effort closely paralleling that followed in previous more successful years, we failed to achieve our goal of balancing discoveries against withdrawals; failed miserably by most figures, and failed badly even if the year's results are most optimistically appraised. This picture is made darker by the generally accepted belief that our backlog of good untested structural prospects in recognized oil territory is being rapidly exhausted.

To meet the present emergency

*Shell Oil Co., Inc., Houston, Tex. President, Society of Exploration Geophysicists.

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there are four general ways in which we might utilize our geophysical exploration facilities.

In the first place, we could apply our existing technique with even greater microscopic precision in the already well explored "golden lanes" of productive territory. Continual improvement in seismic methods has resulted in our ability to map accurately, at a cost, the smallest geological features which offer promise of being commercial structural-type accumulations; so much of our effort has been directed along this avenue that the natural result is now evident in the statistics—an increased number of discoveries is being made but the size of each individual field is small. We have such wide experience and complete statistics in operations of this type that the results of a further program can be estimated in advance, even to the point of hazarding a guess as to the cost of each barrel of oil in situ which will be found by such methods; including the cost of leases and dry holes, the figure will fall not far from 30 cents per barrel on a steeply rising curve. The law of diminishing returns has overtaken this "gleaning" phase in mature producing areas, and it is to be hoped that our imagination is not so atrophied nor our resources so exhausted that we will long be satisfied with it. However, if the necessary facilities are available, and we have to meet a comparatively small objective of discovery, the method has the virtue of furnishing predictable results.

Structure Mapping

In the second place, we could take our proven methods of structural mapping to new territories as yet inadequately explored, either as regards their structure or stratigraphy. In operations of this type we must take the chance of finding that sediments now pronounced as lacking source beds or porosity, or both, turn up a Yates or a Tinsley. We cannot hope to estimate in advance a profitability factor—we may even be totally unsuccessful, but at least in this approach we are playing for high stakes in the best traditions in the industry we serve. The symposium to be conducted by the A.A.P.G. as a part of this program should bring to our attention many such areas.

As a third course, we can again match our technical abilities against the unsolved problems of the geophysically "tough" areas where extensive wildcatting only awaits adequate structural guidance. The problems to be faced in these areas are largely superficial, occasioned by the surface outcrop of limestone, the presence of caliche or thick gravel deposits. Southern Mississippi, a notoriously recalcitrant area, does not qualify under any of these descriptions, and presents an interesting problem which has not yet been completely solved. Such areas have been largely avoided, as long as others offering greater ease of mapping remained partially unexplored; as the more easily mapped territories are exhausted, the incentive grows to direct effort to the more difficult. The challenge presented by the "tough" areas has been taken up and I believe the technical resources of the industry are such that, in most such areas, the outcome is not in doubt.

And, fourth, we can look to new methods to revitalize exploration. The history of geophysical exploration is a succession of surges in activity as new methods or techniques found favor, and each surge initiated a new bulge in the discovery rates. In my opinion, there is no prospect of a powerful new method being brought to immediate commercial success, and I am convinced that the present emergency must be met with the conventional tools already familiar to us, correctly applied, however, in the proper places; we would be foolish indeed to look to any new methods now visible on the horizon to solve our urgent problems for us the easy way.

More Exploration Needed

No conceivable policy of exploration, with a lesser effort than was made in 1942, offers reasonable assurance of maintaining the discovery rate of new fields. Of course, we might be the beneficiary of a windfall such as a second East Texas, and spectacular results might reward pioneering in new territory, but we cannot allow our reserves of petroleum, the most critical of all war materials, to rest upon the outcome of a gamble. It is my belief that to meet the immediate emergency we should persevere in the humdrum mapping of small structures in proven areas with the greater part of our available facilities. Nevertheless, it is to be earnestly hoped that enough facilities will remain to make possible a much expanded program in outstepping and poorly explored areas, as only in this way, I believe, can the creeping paralysis which has beset discovery be stayed. Furthermore, we have the petroleum administrator's announced objective of 4,500 wildcat wells this year to face. If this objective is to be even approached, a high discovery rate of new prospects must be maintained as the backlog is on the way to exhaustion. Even so, many wells must be drilled to test prospects other than conventional closed structural traps in present productive areas; in the oil country there are nowhere near that number of structural prospects known and untested. Such an abundance of wildcats, if it proves economically possible to drill them, should insure the testing of virtually all our structural prospects and of many stratigraphic traps and yet leave enough over to follow up exploration in new areas. Nothing in the present situation justifies a belief that the contribution of geophysical oil can be maintained with less facilities than we had last year; what are the chances of our keeping these facilities intact?

Loss of Personnel

Our success in keeping a full complement of crews in the field during 1942 despite the drain of personnel to the Army and war industry may have created a feeling of false security concerning our ability to continue doing so. Dr. Weatherby, chairman of the war efforts advisory committee of the Society of Exploration Geophysicists, has assembled and analyzed figures bearing on the loss of personnel by geophysical operators, and I am indebted to him for most of the statistics used in this discussion. The total number of technically trained men employed in geophysics is not more than 2,000 and the total complement of men, skilled and semiskilled, in the industry does not exceed 5,000. Of our technically trained staff, 40 per cent has been lost to the armed forces and to war work. Only the farsighted policy which had maintained technical men two deep in nearly all key posts throughout our prewar organization permitted the continuation of operations on the former scale despite this loss of men. We are now down to the first-string team with virtually no reserves, and further losses of technical men will invariably mean the shutting down of field crews. The seriousness of this situation cannot be exaggerated since a complete shutdown of seismograph exploration could be brought about by the removal of some 500 men. The position as regards semiskilled workers is even worse. Statistics which cover 90 per cent of geophysical operations for 1942 disclose that with a total pay roll of 4,370, 1,428 men went into the services and 1,974 into other industries—during the same period, 3,252 replacements were hired, representing a turnover of 75 per cent. In such a highly specialized type of operations, efficiency has naturally suffered; furthermore, the trend of the times may be indicated by the fact that at least four operators have already reduced the number of their crews in the field.

Second only in importance to manpower, is the problem of obtaining the supplies we need. A study of the consumption of critical materials in our operation is illuminating. Our total consumption of dynamite for 1942 was about 5,000 tons, which represents somewhat over 2 per cent of the industrial consumption of the United States. The manufacturers assure us that this comparatively small consumption has no effect on production for war, which is carried on in separate plants and involves a different type of product. Our consumption of steel is even more relatively in-

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significant. Shot hole casing is the largest single item, and, according to my own estimate, it amounted only to some 10,000 tons last year, of which most comprised discarded material of a type not in demand as scrap. Transportation probably constitutes our greatest drain on critical materials. The geophysical industry is operating some 2,000 motor vehicles under unusually severe service conditions, and it is very difficult to see how we could substantially reduce this number.

Serious Loss of Personnel

It is the consensus of opinion amongst geophysical operators that the loss of trained personnel is our most serious problem. The particular type of training common in the ranks of geophysical organizations finds ready acceptance in many technical branches of the armed forces and also in war industry and research. Our ranks have been subjected to assaults from all these quarters and casualties have been high. To offset losses we have replaced men with women to the limited extent which the nature of field work makes proper; we have lengthened hours of work in the field, not only to the maximum of 48 adopted in most understaffed industries, but in most instances to 50, and in some, to 60 hours per week. We have attempted, within the limits imposed by the War Labor Board rulings, to raise the earnings of our personnel to bring them at least within sight of what these same men could earn in other industries.

In times such as these when critical materials and manpower must be doled out with a thrifty eye to the many urgent war demands, we can hardly expect to have our every request granted. We can, and must, assemble the facts which govern our ability to support our part of the war effort and bring these facts home to those who control the over-all effort. If, having before them these facts accurately assembled and realistically interpreted, the War Manpower Commission and the War Production Board decide that a proportion of our facilities must be diverted and exploration curtailed, then, and only then, should we feel free to follow our impulse to get into work now spectacularly contributing to the war effort. The job assigned to us is one which nobody else can do, and I believe we should take every possible step to keep our facilities for executing this job unimpaired; we should not hesitate to make the strongest possible representation to our fellow workers in the industry and also to draft boards and other agencies in an endeavor to hold exploration staffs intact; far from being unpatriotic, I believe this is the most realistic contribution which we, as individuals or as professional societies, can make to the war effort.

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The Geologist in the War

(Continued from Page 37)

4,000 of them are or have been engaged directly or indirectly in the petroleum industry. To say that the American petroleum geologist is superior to others in the technique of discovery and development of petroleum reserves is not an exaggeration. He has been used all over the world and is being used in many parts of it now, in spite of World War conditions, to do the special kind of work for which he is so well trained and experienced.

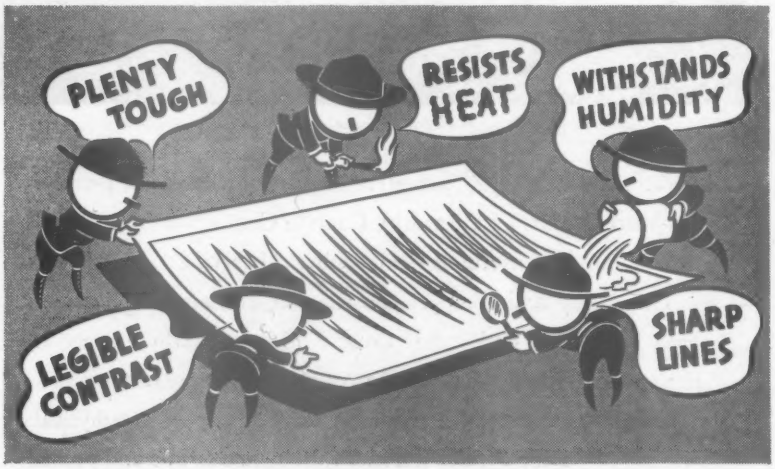
Do you remember but a few years ago how complacent and satisfied the petroleum industry and the public were that we had so much proved reserves—that no situation could arise, not even war, when petroleum needs could not be satisfied by simply turning on a few valves or spigots? Practically all of the petroleum geologists realized that our new discoveries were not sufficient to replace the annual production, but nothing was said about it until a few years ago when E. DeGolyer brought out his remarkable analysis of the actual conditions. Recently, the full purport of this critical situation has been brought very forcibly to the attention of all concerned by the Office of Petroleum Administration for War and many others who have made a careful and thorough study of the situation. In addition, other factors have entered the picture in so far as the ability to produce the requirements of the war demands of the military, civilian, and essential industries is concerned. To quote from E. DeGolyer's paper before the 1943 meeting of the A.I.M.E. on "Petroleum Exploration and Development in Wartime"—"We are not concerned now with this decline of discoveries for effect on reserve position, but are moved by stern need to increase daily productive capacity; and to discover new pools is the quickest and most effective method of achieving such result at minimum expense of manpower and scarce critical materials." Messrs. DeGolyer, Heroy, and others will appear on this program and will give you a very clear and comprehensive analysis of this critical situation. Petroleum and its products are absolutely essential and of paramount importance in the succesful prosecution of this war.

Role of the Petroleum Geologist and Geophysicist in Exploration

Since we are accepting the situation as critical in regard to the necessity for the discovery of new petroleum reserves as outlined by PAW, as has been so clearly stated by Harold L. Ickes, Ralph Davies, E. DeGolyer, William B. Heroy and others, then it is not only the patriotic duty of, but a challenge to, our limited number of petroleum geologists and geophysicists to do everything in their power to bring all of their talents, tools, skills, imagination and resourcefulness into this most important program. Comments on several problems and a few suggestions are offered on the ways and means to assist in increasing our efficiency in that respect:

1. Since so many of our detail and key personnel are not available, the work that they had been doing has been added to the duties of those now having the responsibilities of carrying on. This condition, together with that of spending so much time on consultation, advisory services, war problems, and cooperative duties with government and state agencies, other added duties, and other factors not involved in the normal course of events, may have placed such a heavy burden on the geologist that it is a handicap to the direction and the work of exploring for oil. We hope that the burden, if it is such, is not too heavy, but even so—it must be borne, regardless of sacrifice. In other words, under all conditions, we are not making any sacrifices comparable to the man who offers his life for his country.

We do have a very limited number of unemployed geologists who, if properly placed, would assist to some extent in relieving the shortage. Most



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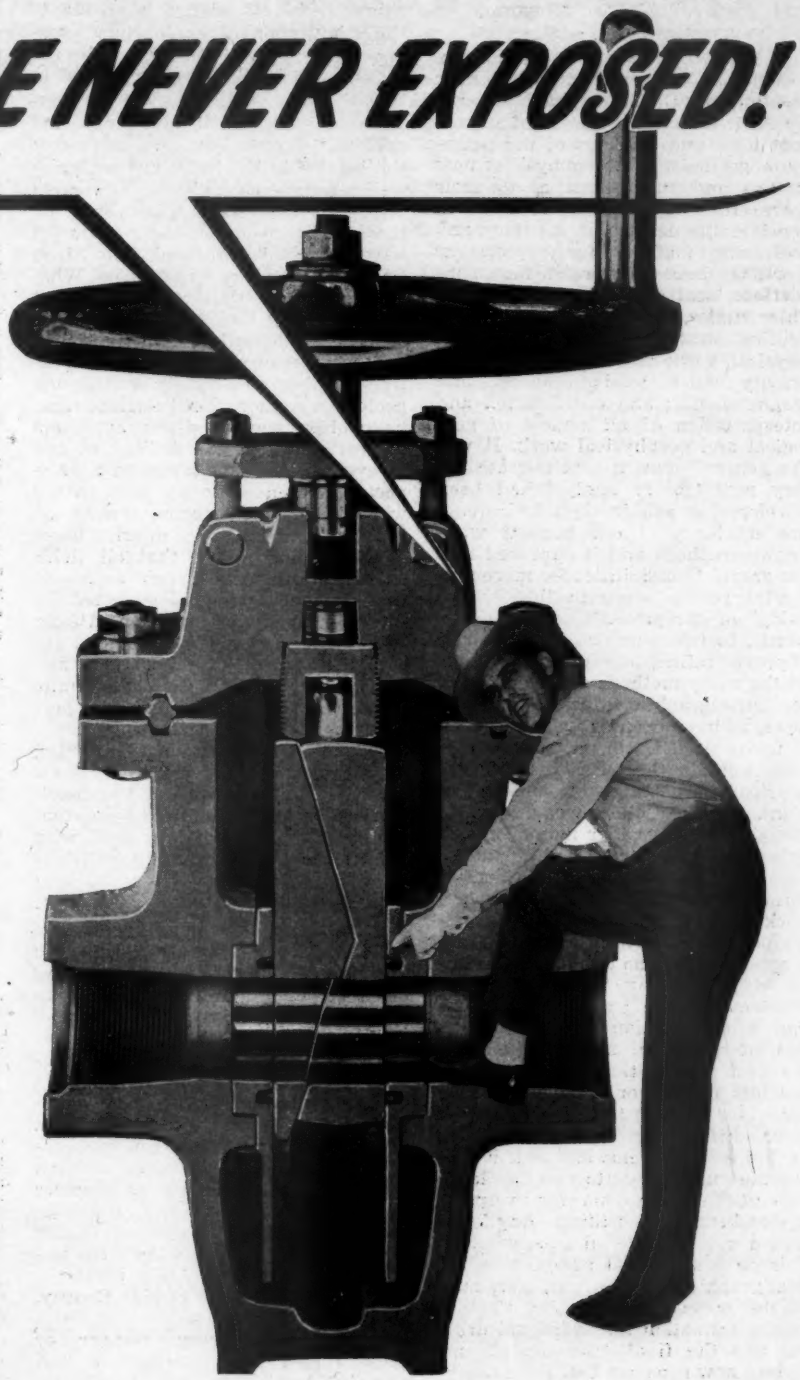

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2. You will recall the symposium, conducted last year at the Denver meeting on "Oil Discovery Methods," by A. I. Levorsen. The most important tools and methods of the petroleum geologist and geophysicist now in use and suggestions as to their more efficient use were discussed in considerable detail. Among the many tools and methods for exploratory work as discussed were surface, subsurface, local and regional stratigraphic studies, core drilling, slim-hole drilling, stratigraphic traps, and geophysical work such as seismograph, gravity meter, torsion balance, and magnetometer; and coordination and interpretation of all phases of geological and geophysical work. It was the general opinion that no satisfactory new tool or method had been developed or was in sight to increase the efficiency of our present well-known methods and it appeared that our greatest possibilities for more successful results were in the "sharpening" of our present tools. In other words, to take our present ones and improve, refine, and overhaul them. Of the many methods and techniques, the stratigraphic trap method and ideas, as have been so well presented to us by A. I. Levorsen, and the improvement in the techniques of geophysical prospecting were most prominent. However, there was a trend of thought that the older methods, such as core drilling, stratigraphic studies, surface (including interpretation of aerial photographs) and subsurface work had not been used to their greatest potential possibilities. All in all, it appeared that no one or lone method of prospecting would solve our problem of finding new reserves, but that a combination of coordination and interpretation of all of them has the best possibilities of success. Regardless of any or all methods, we must face the fact that it is becoming more difficult and more expensive to find new oil fields and that it will become necessary to do a large amount of stratigraphic trap prospecting and random drilling. Any well drilled in a possible oil area, whether it is on a structural prospect or for stratigraphic or other purposes, may be the means of furnishing the desired information for additional drilling and the final discovery of important new reserves. Our laboratories and our specialization in all geological, electrical and geophysical correlations and techniques have improved and are still improving to such an extent that data of any nature can be analyzed very thoroughly so that the ultimate in information is available.

Additional Factors Involved in Exploration Activities

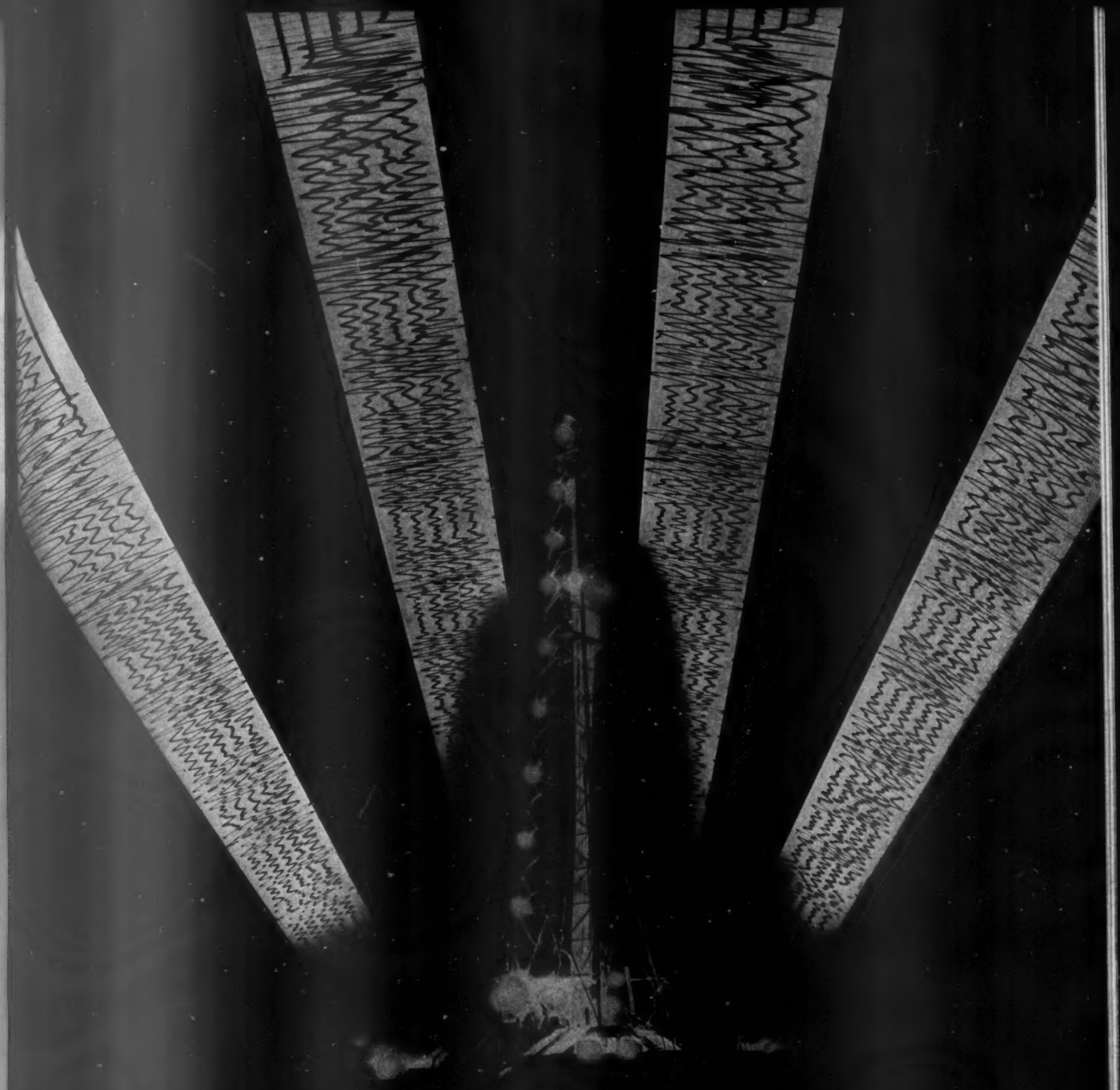
1. Tools and methods alone accomplish the ultimate in successful exploration for reserves. There are other things to be considered as an aid to the stimulation of exploratory prospecting. The whole history of the petroleum industry is outstanding in that the wildcatter who has the venturesome spirit will do things and drill wells contrary to the advice of the leaders in the industry and many well-meaning geologists. Many great oil fields have been discovered by these pioneers—outstanding examples have been E. W. Marland, Tom Slick, Dad Joiner, and scores of others. What did they have that seems to be at least partially lacking today? Nerve, courage, faith, optimism, imagination, and perseverance. Some of our executives in the industry, as well as the geologists under their management, have often become discouraged and disheartened by the drilling of one or even several dry holes on a prospect and then given up faith in the whole deal and become soured on that area and the entire district. Later developments proved that oil fields existed in many of such areas—so that the rewards were collected by those who had the courage and faith to do the impossible. As a good recent example of patience and perseverance, the Pure Oil Co. drilled quite a number of dry holes on a prospect near Pauls Valley in Garvin County, Oklahoma, but, instead of losing faith, they capitalized on the information furnished by each well and added it to that previously obtained—so that finally they "hit the jack pot" with one of the best discoveries in Oklahoma in recent years.

To be more specific in these applications to the petroleum geologists, and even considering all of our tools and methods, there is still something often lacking in the mental makeup of the exploration geologists. You may call it imagination, ingenuity, resourcefulness, or geological philosophy. In the early days, the petroleum geologist did not always have complete or satisfactory information on which to base a recommendation, but, being resourceful and having an open mind, he had no fetters or shackles on his imagination or line of reasoning and would make recommendations which today would be considered unorthodox by some. An example is the Tonkawa oil field of Kay County, Oklahoma. It was discovered by a combination of very meager or sketchy geological information such as a few local dips, structural trend, and questionable subsurface information from a few isolated shallow gas wells. Core drilling or seismograph work could have found the field, but the point to be emphasized here is that the same geological philosophy can be used even with our modern methods of prospecting.

Along the same line, there has been a tendency in recent years for the petroleum geologist to divide themselves into two groups, namely, "Liberals" and "Conservatives." The petroleum geologist by reason of his kind of training and experience is a natural "Liberal" who not only uses all of his scientific and technical knowledge, but also takes into consideration all of the speculative and logical deductions involved. The "Liberals" would include most of the independent and company geologists. The "Independents" on the one hand are probably the most extreme in this respect as they are principally interested in drilling wildcat wells and the promotion or selling of blocks of acreage, while the company geologists on the other hand are primarily interested in selling the managements of their companies on the merits of their recommendations. The progress and initiative of their respective companies in the discovery of new oil fields are largely dependent on their ability in this respect. The "Conservatives" are the ones who are never satisfied to make recommendations without exhausting all possible means of checking the possibilities with all geological and geophysical methods before venturing to make qualifying recommendation. It seems that somewhere in the course of their experience, they have lost most of that perspective so common to most geologists and their speculative and logical reasoning powers have become dwarfed or stunted. Fortunately there are not too many petroleum geologists in the latter class. The suggestion offered here is that the so-called "Conservatives" should become inoculated with some of the characteristics of the "Liberals." It has been the "Liberals" who by their liberal thinking have discovered most of the oil fields accredited to geological information, and it is this group who are willing to, and do, accept the responsibilities for the discovery of new reserves during this emergency.

Need for Cooperation

2. Regardless of the excellent work of the petroleum geologist and geophysicist, it can still be buried and accomplish nothing as far as satisfactory results are concerned, unless there is cooperation between them and the management. In the case of the independent geologists, they are dependent on receiving the same cooperation from the company geologists and managements. It is not necessary to go into detail on this subject, as all of you know that the policies of the managements in the different companies are not the same and also that there is a different degree of cooperation in this respect in the different companies. As an extreme case, there are the companies where the geological and geophysical departments are completely submerged into very subordinate positions of influence in connection with exploratory activities. On the other hand, there are many companies in



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which these departments dominate, not only the exploratory activities, but all others in the development and production of oil. To go a little further, you have noticed that in many of these companies, the petroleum geologists have climbed up through the ranks of administrative to the uppermost and top ranking executive positions in the petroleum industry and in the government agencies. The history of the rise of many company petroleum geologists as well as independent geologists to positions of affluence would read like some of Horatio Alger's books.

You have probably noticed that in general the successful independents and companies in the exploration for oil are the ones where there is close cooperation between the geological and geophysical work and the managements. The complete cooperation of the other departments of exploration and the managements with the geological and geophysical departments will insure a greater success in the discovery of new petroleum reserves.

3. There is still another suggestion that seems to offer possibilities in our assistance to the program of discovery of new petroleum reserves. Most of the industries have unlocked their hoarded caches of secret information on patents and all other things that they have guarded very zealously during normal peacetimes. Now, during the war, they have voluntarily pooled everything necessary for the benefit of the nation in the prosecution of the war. The petroleum industry has done likewise in practically all phases of its activities, but there is still room for an all-out participation in a few other phases. All of us know how the geological and geophysical information of the different companies is guarded under lock and key and also that the most secret information is imparted to only a few in such organizations. This is not a new method of doing business, as it has been the same for many years. The petroleum geologists and geophysicists are just as much responsible for this situation as the managements. What would be good business practice in normal peacetimes may not be the same or for the best interests of our country in the prosecution of the war, since we know that petroleum and its products and discovery of new reserves are vitally important.

To make a direct application of the foregoing statement, let us assume that individuals or companies have limited or unlimited geological and geophysical information on certain prospective areas and that they will explore these prospects in the very near future so that the practical results of condemnation or discovery will be accomplished without divulging the so-called secret information. Yet there are many examples where this would not secure the best results in the interest of new discoveries. You are not being urged to reveal all of your information on districts and states, or even on local areas except to interested parties having lease ownership. All of you know that there are many prospects where lease ownership is diversified to such an extent that no one company or individual would be justified in exploring without assistance. It is in these localized known prospects that the exploration efforts need to be stimulated and the geologists and geophysicists can do more than any one else in this respect, if permitted to pool or communitize all of their information and if such pooling of information is restricted to the benefit of the participants. Many examples can be cited where as many as 8 or 10 companies have protective acreage and all of them have their own geological and geophysical information. If all such information were pooled and thoroughly discussed by the interested geologists and geophysicists and recommendations made to their respective companies, there is a greater probability that the managements would be favorably interested in following through with unitization and prospecting. Then, again, with as complete information as possible, better discovery locations can be made and thus the average ratio of discovery wells to total number of wildcat wells drilled could be reduced.

The "Welcome" mat is out in Fort Worth to members of the American Association of Petroleum Geologists and the Society of Exploration Geophysicists. It is our sincere hope that their visit to Fort Worth will be a happy and profitable one.

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Wildcat Drilling in 1942

(Continued from Page 40)

This means that 15.3 per cent of the holes drilled, and 17.8 per cent of the footage drilled, was successful in 1942. One producer foot was drilled for every 4.62 ft. of dry hole. One discovery well was drilled for every 5.14 dry holes. The average depth of hole was 3,782 ft.

In the southern-states district (Fig. 2), in 1942, a total of 6,633,893 ft. was drilled in 1,424 holes, divided as follows:

232 producers	1,296,558 ft.
1,192 dry holes	5,337,335 ft.

In this area, then, 16.3 per cent of the holes drilled, and 24.5 per cent of the footage drilled, was successful. One producer foot was drilled for every 4.12 ft. of dry hole. One discovery well was drilled for every five dry holes. The average depth of hole was 4,659 ft. For comparison with statistics for this same area in 1938, 1939, 1940, and 1941, see Table 2.

Selection of the location for a wildcat well may be based on geology (surface geology, subsurface geology, trend along known structural or stratigraphic conditions, local or regional, or shallow exploratory drilling); or it may be based on geophysics (exploration by seismograph, torsion balance, gravity meter, magnetometer, etc.; or it may be based on some nontechnical suggestion or requirement, such as "creekology," "hunch," "doodlebug," promotion, lease obligation, reported showing of oil or gas in holes previously drilled, etc. In many cases the reason for choosing the location cannot be ascertained.

In Table 3 are listed the reasons for drilling the wildcats in 1942 using the best information available from men familiar with such statistics, each in his own state or district. According to these figures, 460 wildcats drilled on technical advice (geology and/or geophysics) were successful (oil or gas), and 2,058 were dry; 22 holes, located for nontechnical reasons, were producers, and 587 were dry; 12 producers and 80 dry holes were located for reasons unknown. These figures show that 18.3 per cent of the holes drilled on technical advice were producers as contrasted with 4.9 per cent successful in the case of the holes located without technical advice. Therefore, in 1942 locations based on technical recommendations were more than 3.7 times as successful as those drilled without such advice. In the southern states area (Fig. 2) 2.8 per cent of the wildcats, located without technical advice, were producers, whereas 19.2 per cent of the holes located on technical advice were producers.

Comparison With 1941

Comparing last year's figures* with figures for 1942, we note the following conspicuous changes.

1. There was an increase in wildcat drilling in California (up from 124 holes in 1941 to 163 holes in 1942, and up from 640,470 ft. drilled in wildcats in 1941 to 817,060 ft. in 1942); and in Kansas (up from 237 wildcat holes and 828,473 ft. drilled in wildcats in 1941 to 330 holes and 1,161,794 ft. in 1942). This was a 31 per cent increase in holes and a 27.5 per cent increase in total footage in California, and a 40 per cent increase in both number of holes and total footage in Kansas. In Mississippi 60 wildcats were drilled in 1942 as compared with 52 in 1941, but the footage increased considerably—from 250,933 ft. in 1941 to 316,563 ft. in 1942. In Oklahoma there was a slight increase in number of wildcats drilled (up from 246 to 254), and the footage increased from 910,969 ft. to 1,028,867 ft.

2. On the other hand, there were moderate decreases in Illinois (591 holes in 1941, down to 549 holes in 1942, but the footage increased from 1,341,743 in 1941 to 1,367,291 in 1942); in Louisiana (202 holes and 1,343,341 ft. drilled in 1941, down to 189 holes and 1,288,220 ft. drilled in 1942); and Michigan (231 holes drilled in 1941 contrasted with 216 holes in 1942; but the total footage here increased from

*F. H. Lahee, "Wildcat Drilling in 1941, With Comments on Discovery Rate," Bull. Amer. Assoc. Petrol. Geol., Vol. 26, No. 6 (June 1942), pp. 969-982.

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Fig. 2—A comparison of the number and footage of producers and dry holes

515,969 in 1941 to 541,209 in 1942). In Texas there was a larger drop from 1,210 holes and 4,969,336 ft. in 1941 to 1,076 holes and 4,636,205 ft. in 1942. For Texas this was an 11 per cent drop in wildcats drilled and a drop of 6.7 per cent in wildcat footage drilled in 1942 as contrasted with 1941.

3. Rather striking is the fact that, in 1942, the average depth of hole increased in all these states except California. The largest increases in average depth of hole were in Mississippi and Oklahoma (in each case a 9 per cent increase), and in Texas (an increase of 5 per cent).

4. The degree of success of wildcatting with technical advice on locating the hole is still several times that where no technical advice is used, but there seems to be quite a little variation from year to year. In 1937 there were three times as many discovery wildcats drilled on technical advice as there were drilled for nontechnical reasons; in 1938 this factor had decreased to between 2.2 and 3.2, and in 1939 it had further decreased to between 1.5 and 2.2. In 1940 it jumped to 3.7, and in 1941 it increased further to more than 5. In 1942 it was 3.7.

TABLE 1—Number of Oil Wells, Gas Wells, and Dry Holes Drilled as Wildcats in 1942

State—	Oil discovery		Gas discovery*		Dry		Total holes	Total footage drilled	Av. depth (ft.)†
	No. of holes	Footage drilled	No. of holes	Footage drilled	No. of holes	Footage drilled			
Alabama	0	0	0	0	9	26,910	9	26,910	0
Arkansas	3	20,454	2	10,531	42	194,605	47	225,590	4,800
California	18	132,010	1	5,254	144	679,796	163	817,060	5,013
Colorado	0	0	0	0	6	27,623	6	27,623	0
Florida	0	0	0	0	4	12,635	4	12,635	0
Georgia	0	0	0	0	2	10,323	2	10,323	0
Illinois	89	249,887	6	3,238	454	1,114,166	549	1,367,291	2,490
Indiana	28	59,178	0	0	94	172,524	122	231,702	1,899
Iowa	0	0	0	0	3	5,048?	3	5,048?	0
Kansas	30	107,433	4	14,608	296	1,039,753	330	1,161,794	3,521
Western Kentucky	10	19,364	1	1,265	47	80,051	58	100,680	1,736
Louisiana	23	202,926	14	139,457	152	945,835	189	1,288,220	6,816
Michigan	23	75,936	3	5,740	190	459,533	216	541,209	2,506
Mississippi	0	0	0	0	60	316,563	60	316,563	5,276
Missouri	1	1,447	0	0	5	10,321	6	11,768	0
Montana	2	5,652	1	1,552	4	10,638	7	17,842	0
Nebraska	0	0	0	0	43	111,299	43	111,299	2,588
New Mexico	7	19,921	1	6,950	32	99,290	40	126,161	3,154
Ohio, Northwest	1	1,736	0	0	8	17,722	9	19,460	0
Oklahoma	32	137,542	3	6,782	219	884,543	254	1,028,867	4,051
Tennessee	0	0	0	0	7	12,172	7	12,172	0
Texas	140	657,823	43	245,444	893	3,732,938	1,076	4,636,205	4,309
Utah	0	0	0	0	1	2,222	1	2,222	0
Wyoming	4	30,313	3	13,338	11	40,556	18	74,207	0
Total	411	1,711,626	82	454,159	2,726	10,007,068	3,219	12,172,851	3,872

*Gas-and-distillate wells, of which there were 29, are included in this column.
†Averages have been recorded here only for states where more than 25 wildcats were drilled in 1942.

TABLE 2—Comparative Statistics for All States Shown in Fig. 2*

	Producers drilled				Dry holes drilled				Total wildcats drilled	Average depth (ft.)	Dry-hole feet drilled for each producer ft.
	Holes		Footage		Holes		Footage				
	No.	Per cent	Ft.	Per cent	No.	Per cent	Ft.	Per cent			
1938	200	13.6	984,262	17.4	1,271	86.4	4,667,402	82.6	1,471	3,842	4.74
1939	161	12.6	779,345	14.8	1,113	87.4	4,501,669	85.2	1,274	4,145	5.90
1940	187	12.8	919,506	†14.9	1,279	87.2	†5,251,273	†85.1	1,466	†4,209	†5.71
1941	256	16.5	1,264,774	18.4	1,305	83.5	5,578,975	81.6	1,563	4,372	4.41
1942	232	16.3	1,296,558	24.5	1,192	83.7	5,337,335	75.5	1,424	4,659	4.12

*In this table New Mexico data are from southeastern part of the state only.
†See Bull. Amer. Assoc. Petrol. Geol., Vol. 25, p. 1938, where corrections are mentioned for these figures as they appeared in Table 2, p. 1001, of the same volume.

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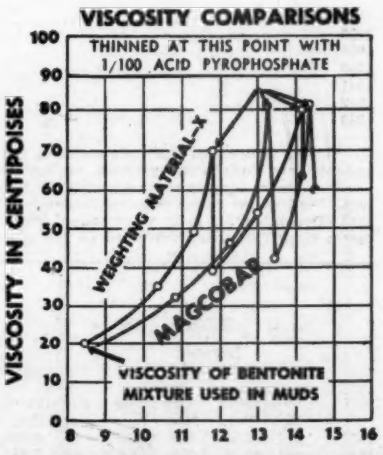

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TABLE 3—Basis for Locating Wildcats Drilled in 1942

State—	Geology		Geophysics*		Geology and geophysics		Sundry nontechnical		Unknown		Totals		Grand total
	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	Prod.	Dry	
Alabama	....	3	....	3	....	....	....	3	....	....	....	9	9
Arkansas	1	13	4	15	....	4	....	8	....	2	5	42	47
California	14	94	2	11	3	16	....	21	....	2	19	144	163
Colorado	....	3	....	2	....	....	....	1	....	....	....	6	6
Florida	....	....	....	....	....	....	....	4	....	....	....	4	4
Georgia	....	....	....	1	....	....	....	1	....	....	....	2	2
Illinois	67	293	5	25	5	13	7	83	11	40	95	454	549
Indiana	23	37	5	13	....	....	....	26	....	18	28	94	122
Iowa	....	2	....	....	....	....	....	1	....	....	....	3	3
Kansas	23	110	5	56	2	12	4	118	....	....	34	296	330
Western Kentucky	11	36	....	....	....	2	....	7	....	....	11	47	58
Louisiana	19	37	18	79	....	9	....	21	....	6	37	152	189
Michigan	27	187	....	2	....	....	....	....	....	....	27	189	216
Mississippi	....	22	....	21	....	....	....	17	....	....	....	60	60
Missouri	1	5	....	....	....	....	....	....	....	....	1	5	6
Montana	2	2	....	....	....	....	1	2	....	....	3	4	7
Nebraska	....	9	....	3	....	2	....	29	....	....	....	43	43
New Mexico	6	28	....	1	2	2	....	1	....	....	8	32	40
Ohio, Northwest	....	4	....	....	....	....	....	3	1	1	1	8	9
Oklahoma	9	71	22	84	1	....	3	64	....	....	35	219	254
Tennessee	....	4	....	....	....	....	....	3	....	....	....	7	7
Texas	101	466	49	173	26	73	7	171	....	10	183	893	1,076
Utah	....	1	....	....	....	....	....	....	....	....	....	1	1
Wyoming	3	4	1	2	3	1	....	3	....	1	7	11	18
Total	307	1,433	111	491	42	134	22	587	12	80	494	2,725	3,219

*Including geochemistry.

Those who are especially concerned with the results of seismographic work will be interested to know that, in 1942, 109 wildcats out of 566 located on seismographic data were successful, and an additional 52 wildcats were successful out of 163 located on a combination of seismographic and geologic advice.

Wildcatting is the industry's method of seeking new oil. From the experience of 1941 and 1942 we may say that one wildcat in approximately 6.5 is successful — and this takes into consideration not only all oil discovery wells but also those which discover gas or distillate and gas.

There is still an amazing degree of ignorance, or a lack of understanding, evidenced by many people who, in one way or another, are led to use statistics on wildcatting and on oil reserves. And it is notorious that the people who most severely criticize the data and estimates published by committees composed of trained, careful, conservative scientists, are those who do not take the time or trouble to read the reports presented in explanation of these data and estimates. For this reason we suggest a rereading of our report of last year where we attempted to explain the meaning of "proved reserves" and of "discovery rate."

Among all the states listed in Table 1, there are 11 in which wildcatting has been especially active during the past few years. These eleven are: Arkansas, California, Illinois, Indiana, Kansas, Louisiana, Michigan, Mississippi, New Mexico, Oklahoma, and

TABLE 4

	Estimated proved reserves in United States at beginning of year* (barrels)	Wildcats drilled during year indicated*	
		Number	Footage
1937	13,063,000,000	2,224	8,387,615
1938	15,507,268,000	2,638	8,860,484
1939	17,348,146,000	2,589	8,624,602
1940	18,483,012,000	3,038	10,144,870
1941	19,024,515,000	3,264	11,615,085
1942	19,589,296,000	3,219	12,172,851
1943	20,082,793,000		

*These figures for reserves includes the entire United States, but for wildcats they include all states regarded as prospective for oil except New York, Pennsylvania, eastern Ohio, West Virginia, and eastern Kentucky.

The above figures on reserves were taken from "Facts and Figures," 7th ed., p. 74, published by the American Petroleum Institute, 1941. Figures for reserves as of January 1, 1942, were taken from the Am. Petrol. Inst. Quarterly for April, 1942. Figures for January 1, 1943 (December 31, 1942) were taken from a recent press release from the American Petroleum Institute. The data for wildcats were taken from the articles printed in the A.A.P.G. Bulletin, and listed in Footnote 3.

TABLE 5—Statistics on Wildcats in Area of 11 States*

	Located on technical basis				Nontechnical location				Unknown basis for location				Total				Grand total Wildcats	Total footage		No. ft. in dry holes drilled per foot in producing wildcats
	Producers		Dry holes		Producers		Dry holes		Producers		Dry holes		Producers		Dry holes			Producers	Dry wildcats	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.				
1937	214	16.05	1,119	83.95	17	5.80	276	94.20	48	9.21	473	90.79	279	12.99	1,868	87.01	2,147	1,188,366	7,002,875	5.89
1938	283	17.93	1,295	82.07	43	7.61	522	92.30	17	4.67	347	95.33	343	13.68	2,164	86.32	2,507	1,482,889	7,119,867	4.80
1939	216	13.33	1,404	86.67	43	6.15	656	93.85	10	4.85	196	95.15	269	10.65	2,256	89.35	2,525	1,107,395	7,344,424	6.63
1940	309	15.69	1,660	84.31	35	4.57	731	95.43	11	8.09	125	91.91	355	12.37	2,516	87.63	2,871	1,397,496	8,416,015	6.02
1941	463	20.17	1,832	79.83	29	3.92	710	96.08	0	0	55	100.00	492	15.92	2,597	84.08	3,089	2,023,184	9,222,217	4.55
1942	439	18.25	1,967	81.75	21	3.81	530	96.19	11	12.36	78	87.64	470	13.37	2,575	86.63	3,046	2,101,116	9,639,546	4.59
'37-'41	1,485	16.88	7,310	83.12	167	5.45	2,895	94.55	86	6.70	1,196	93.30	1,738	13.22	11,401	86.78	13,139	7,199,330	39,105,398	5.43
'38-'42	1,710	17.33	8,158	82.67	170	5.12	3,149	94.88	49	5.76	801	94.24	1,929	12.83	12,108	87.17	14,037	8,112,080	41,742,069	5.13

*This area includes California, New Mexico, Texas, Oklahoma, Kansas, Arkansas, Louisiana, Mississippi, Illinois, Indiana, and Michigan. Full statistics were not available on the other producing states.

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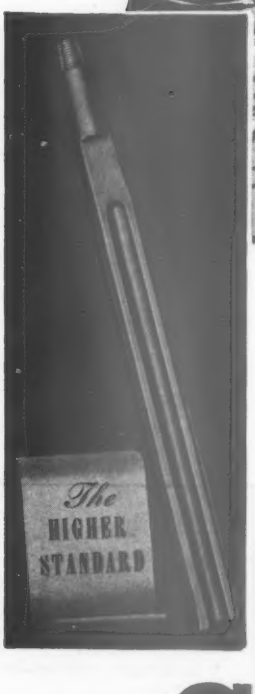

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Texas. Also within this group of 11 states is 95 per cent of the country's proved oil reserves (as of January 1, 1943). It was for these reasons that last year we made a special study of wildcatting in relation to reserves in these states; and this year we shall repeat this survey as it applies to 1942.*

Tables 4 and 5 need no particular comments, except that the reader will note that in Table 5 we have contrasted averages for the 5-year period from 1937 to 1941, inclusive, with averages for the overlapping 5-year period of 1938-1942, inclusive.

There are several ways of estimating the degree of success of wildcat drilling. We have called successful those wildcat holes (and the footage drilled in these holes), which were completed as commercial producers. However, we can consider wildcatting in relation to oil reserves discovered by this class of drilling. In Table 6, under A, are recorded the proved reserves as of January 1 in each of the indicated years, and for the 11-state area under discussion. Under B is shown, for each January 1, the net change in estimated proved reserves since the preceding January 1, allowing for production during that 12-month period. Under C are the new proved reserves which are directly attributable to wildcat discoveries made during the year. Under D are the revisions and additions of estimated proved reserves in fields already discovered in previous years, these revisions and additions having been made on the basis of new information obtained through development during the year indicated. Under E all the new reserves (C+D) are totaled for each year.

Last year an item was included in Table 6† showing the "number of years of remaining supply," a figure derived by dividing the total proved reserves as of January 1 of a given year by the total production of the preceding year. This figure was recorded merely to indicate a trend. However, in the present report it has purposely been omitted since it offers opportunity for serious misunderstanding. The proved oil reserves, estimated as of any given date, cannot be withdrawn at whatever desired rate the demands of the moment may require.

As we have explained, the reserves in Group D might be assigned back to the year of discovery, but due to the present incompleteness of available statistics, this cannot readily be done. Instead, we may regard both groups of new reserves (C and D) as directly and indirectly resulting from original wildcat discoveries. If, for

*Information on proved reserves is taken from the American Petroleum Institute Quarterly, in April of each year from 1937 to 1943, inclusive. Information on wildcatting is from papers listed in Footnote 3, p. 969.

†G, Table 6, p. 978, Vol. 26, Bull. Am. Assoc. Petrol. Geols. (1942).

TABLE 6—Statistics on Proved Reserves in Area of 11 States*

	1937	1938	1939	1940	1941	1942	1943
A. Proved reserves as of Jan. 1 of year indicated	12,241,885,000	14,664,035,000	16,630,452,000	17,723,393,000	18,226,542,000	18,816,785,000	19,260,415,000
B. Net change in proved reserves since Jan. 1 of previous year		+2,422,150,000	+1,966,417,000	+1,092,941,000	+503,149,000	+590,243,000	+443,630,000
C. New proved reserves discovered during year indicated	896,692,000	805,293,000	337,989,000	280,882,000	423,551,000	254,801,000	
D. New reserves added through extensions and revisions of old fields during year indicated	2,739,254,000	2,313,356,000	1,955,507,000	1,505,816,000	1,496,610,000	1,496,536,000	
E. Total new proved reserves added (C+D)	3,635,946,000	3,118,649,000	2,293,496,000	1,786,698,000	1,920,161,000	1,751,337,000	
F. Production during year indicated	1,213,796,000	1,152,231,000	1,200,555,000	1,283,490,000	1,329,918,000	1,307,707,000	
G. Newly discovered reserves (C) per wildcat hole drilled in year indicated	417,647	321,217	133,857	97,834	137,115	83,600	
H. Newly discovered reserves (C) per foot of wildcat hole drilled in year indicated	109.4	93.6	39.9	28.6	37.7	21.7	
I. New proved reserves (E) per wildcat hole drilled in year indicated	1,693,500	1,243,976	908,315	622,326	621,612	574,900	
J. New proved reserves (E) per foot of wildcat hole drilled in year indicated	443.88	362.52	271.36	182.07	170.75	149.1	

*This area includes Arkansas, California, Illinois, Indiana, Kansas, Louisiana, Michigan, Mississippi, New Mexico, Oklahoma, and Texas. All figures are in barrels.

each year, we divide the newly discovered proved reserves (C, Table 6) by the number of wildcats drilled in that year, or by the total wildcat footage drilled in that year, we shall have a measure of the degree of success of wildcatting in terms of newly discovered proved reserves (G and H, Table 6); and if we divide the total new proved reserves (discoveries plus revisions plus extensions; E, Table 6) by the number of wildcats drilled, or by the total wildcat footage drilled, we shall have a measure of the degree of success of wildcatting assisted by outpost drilling (I and J, Table 6). Under G and H the measure is short. Under I and J, the measure may be too large or too small. In any case, there is an unavoidable error in estimating **rate of discovery**, or degree of success in wildcatting, measured in terms of new reserves; but the figures obtainable by these methods, as here described, are a significant index. As shown graphically in Fig. 3, they reveal a marked drop in the rate of discovery through the years 1937 to 1942, and this in spite of a steadily increasing footage drilled in wildcats and, except in 1942, an increasing number of wildcats drilled in each year. From 109.4 bbl. of new reserves discovered per foot of wildcat drilled in 1937 there has been a drop to only 21.7 bbl. per foot of wildcat drilled in 1942. For all the states included in Fig. 1 and in Table 1 the corresponding drop has been from 110.7 bbl. in 1937 to 21.4 bbl. in 1942.

The seriousness of this decline in the success of wildcatting has been widely stressed, and reasons for it have been explained. The principal reason, as we stated last year, lies in the fact that new geological traps for oil are becoming increasingly difficult to find, (1) because they are fewer, (2) because they are deeper, (3) because they are associated with less-pronounced geological structures, and (4) because low-permeability sands,

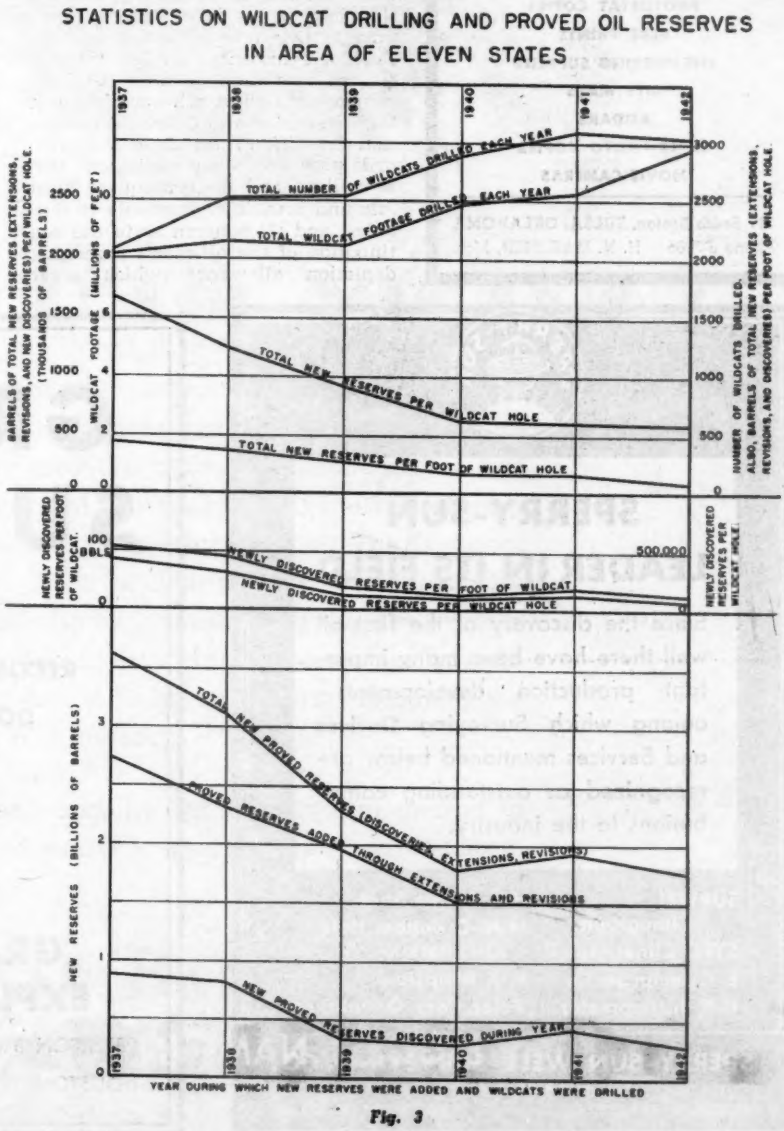
STATISTICS ON WILDCAT DRILLING AND PROVED OIL RESERVES IN AREA OF ELEVEN STATES
1937
1938
1939
1940
1941
1942
TOTAL NUMBER OF WILDCATS DRILLED EACH YEAR
TOTAL WILDCAT FOOTAGE DRILLED EACH YEAR
TOTAL NEW RESERVES PER WILDCAT HOLE
TOTAL NEW RESERVES PER FOOT OF WILDCAT HOLE
NEWLY DISCOVERED RESERVES PER FOOT OF WILDCAT
NEWLY DISCOVERED RESERVES PER WILDCAT HOLE
TOTAL NEW PROVED RESERVES (DISCOVERIES, EXTENSIONS, REVISIONS)
PROVED RESERVES ADDED THROUGH EXTENSIONS AND REVISIONS
NEW PROVED RESERVES DISCOVERED DURING YEAR
BARRELS OF TOTAL NEW RESERVES (EXTENSIONS, REVISIONS, AND NEW DISCOVERIES) PER WILDCAT HOLE (THOUSANDS OF BARRELS)
WILDCAT FOOTAGE (MILLIONS OF FEET)
NEWLY DISCOVERED RESERVES PER FOOT OF WILDCAT
BBLS
NEW RESERVES (BILLIONS OF BARRELS)
NUMBER OF WILDCATS DRILLED. ALSO, BARRELS OF TOTAL NEW RESERVES (EXTENSIONS, REVISIONS, AND DISCOVERIES) PER FOOT OF WILDCAT HOLE
NEWLY DISCOVERED RESERVES PER WILDCAT HOLE
500,000
YEAR DURING WHICH NEW RESERVES WERE ADDED AND WILDCATS WERE DRILLED

Fig. 3

formerly overlooked, are now being exploited. Based on experience to date we may say that, to step up the rate of discovering new reserves, an increasing number of wildcats must be drilled each year, and the holes drilled must be carried to greater depths than formerly, wherever the deeper stratigraphic section holds any promise whatever. "If we are to maintain a satisfactory discovery rate, as applied to new reserves, we must become more vigorous than heretofore in our wildcatting campaign."

These were our words a year ago. They reiterate the opinion of the entire oil fraternity. They express the warnings and recommendations of the Petroleum Administration for War, and its predecessor, the Office of Petroleum Coordinator. To heed them is of the utmost importance during this period of large and growing war demands. Then why were fewer wildcats drilled in 1942 than in 1941? There were several reasons. First, as is almost universally recognized by the oil fraternity, the price for crude was too low to encourage taking the obvious increased risks of wildcatting. Second was the reduction in skilled labor for drilling. Third, there was the doubt as to whether, if oil were discovered, enough pipe and other necessary equipment would be available to take care of the ensuing offset requirements and continuous-drilling requirements of the lease contract. Fourth, there was the question in many areas whether oil, if found, could be transported for refining and utilization. These factors have served to weaken the exploration effort as applied to wildcat drilling. And there are other factors which will still further impede the wildcatting program unless they are corrected in time. Such, for instance, are (1) the continuing reduction of technical staffs composed of those who are indispensable in the several phases of exploration for oil; (2) the deterioration of drill pipe and other equipment used in drilling, and the consequent twist-offs and breakage, especially in deep holes; and (3) concern as to the continuation of the oil man's percentage depletion allowance which serves as an incentive for wildcat drilling.

These factors which militate against an expansion of the wildcatting program are well known. They have been widely expounded. Their significance must somehow be driven home in the minds of those who control them and who can correct them, for otherwise it is doubtful whether enough wildcats will be drilled in 1943 even to approach the 4,500 urgently recommended by the Petroleum Administration for War and by all those who realize the urgency of searching for more oil reserves. Toward this end it is essential that two facts be thoroughly appreciated—two facts which are vital to an adequate understanding of this whole problem of wildcatting and reserves. The first, already discussed above, is the fact that the rate at which oil can be withdrawn from its natural reservoir is limited; and the second is the fact that there is bound to be a considerable period of time elapsing between geological or geophysical exploration for oil and discovery of oil, and between discovery of oil and developed exploitation.

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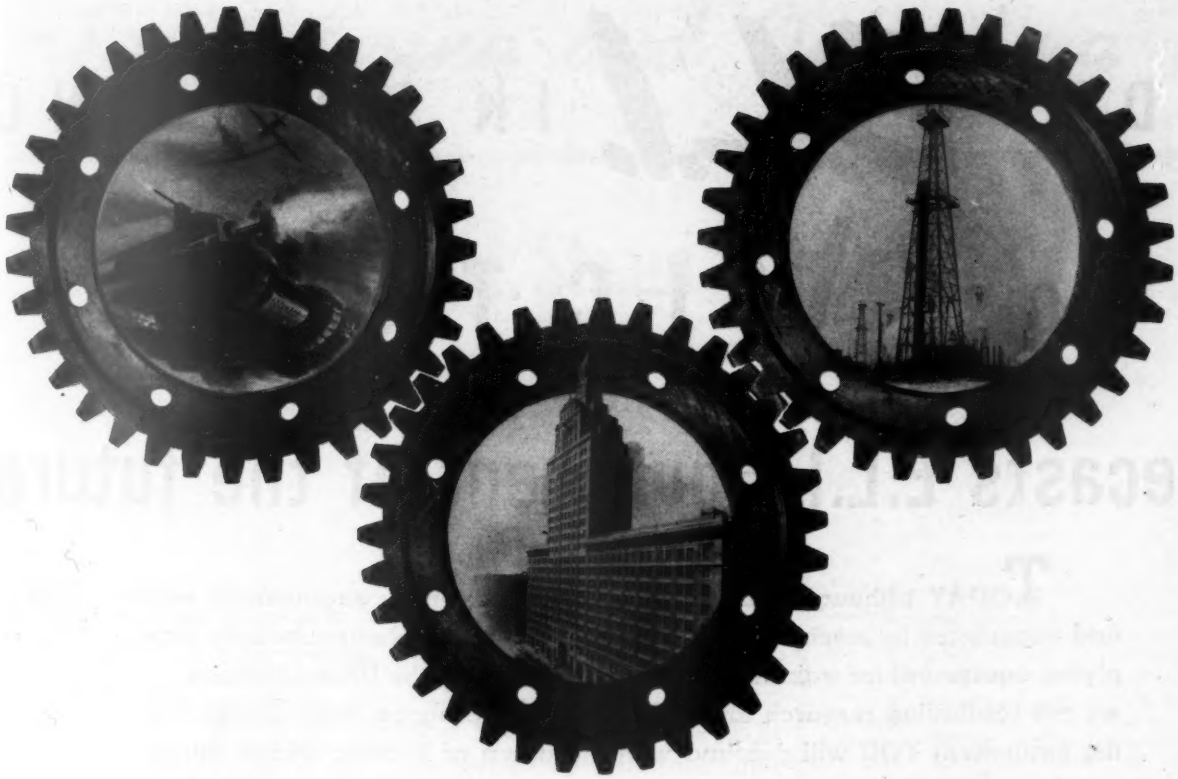

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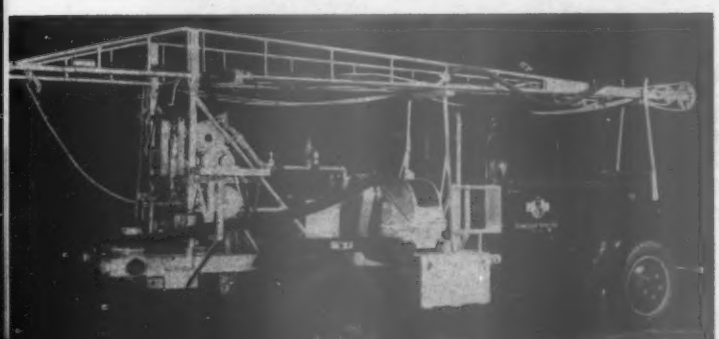

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- Pipe Line Detector

Increased Steam Capacity Versus the Materials Problem

*by G. E. Anderson**

How to do more with less is a necessity that confronts management in every field today. In this article the author deals with means of increasing boiler output, chiefly oil and gas-fired units, with minimum expenditure of materials.

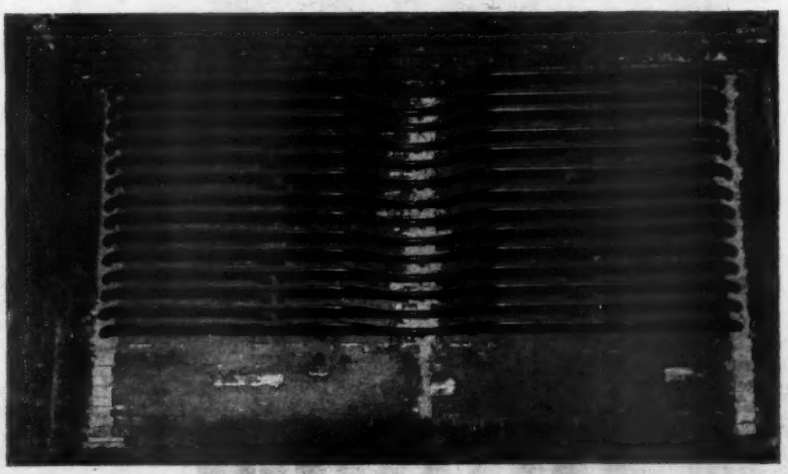
UNDER present conditions of war demands where a maximum of materials must be allocated to the manufacture of fighting machines and processing equipment required to supply them with ammunition and motive power, it is necessary that full use be made of existing auxiliary equipment. Therefore every effort must be made to insure that such auxiliaries stay on the line and operate at maximum possible continuous capacity and efficiency.

In refineries we are faced today with the problem of expanding facilities for the production of primary fighting materials with minimum expenditures of iron, steel, etc., for the boiler units, regardless of the fact that an unfailing supply of steam must be available at all times. Quite evidently this condition dictates the tuning up or revamping of existing equipment as far as practicable when additional steam is required and makes it mandatory that such units be operated with every care and attention. When the possibilities of improving existing equipment have been exhausted, and before new steam generating units are purchased, consideration should be given to the full utilization of waste heat recovery methods which, in many cases, may prove adequate to supply the increase required to carry full plant loads.

It is not the purpose of this article to discuss in detail the many causes of reduced boiler capacity, or their correction, but to call attention broadly to such factors and suggest means of increasing output with minimum expenditure of materials. We will deal principally with oil and gas-fired units and will consider first the possibilities of the existing boilers from the standpoint of more efficient operation.

Boiler capacity is dependent upon the cleanliness of all heat transmitting surfaces, both inside and out. To insure external cleanliness soot blower equipment must be maintained in good condition and careful attention given to operating procedures recommended by the manufacturer. In this connection it is well to make a check of jet alignment to insure maximum cleaning efficiency. It is also important to have regular blowing schedules, the length of intervals between operation being determined by observation of the rate of soot or slag accumulation and effect on exit gas temperatures. Where accumulations occur that cannot be reached or removed by existing soot blower equipment provisions should be made to permit hand lancing. It is equally important that internal surfaces be kept free from scale, the presence of which is doubly detrimental since in addition to loss of efficiency, tube failures can result with consequent boiler outage. Therefore, careful attention should be given to proper water treatment, the maintenance of minimum possible boiler water concentration and the control of water level to prevent excessive carryover.

Boiler capacity is seriously affected by leakage through settings, baffles,



When space is not available for a convection-type superheater, a radiant superheater as shown here can be installed in the furnace walls

*Assistant Manager, Steam Division, Foster Wheeler Corp.

seals, bypass dampers, also joints in casings, flues and ducts. Such leaks can easily be detected by checking CO_2 drops, by observation of gas temperatures in various zones and by candling of joints. A thorough check should be made and leakage reduced to the most practical minimum. This will insure that the capacity of draft producing equipment is translated into maximum steam output and is not partially dissipated in handling nonproductive gases. Mention should be made of the advisability of checking boiler dampers on natural draft units to insure that they move freely and are adjusted properly to maintain correct furnace drafts at all loads.

Proper Burner Adjustment

Proper burner adjustment is an important factor in maintaining boiler capacity. Poor adjustment results in poor combustion efficiency caused by either a too high or a too low percentage of excess air and by increased carbon loss. Care should be exercised in adjustment to obtain proper length and shape of flame to avoid impingement on furnace walls. Impingement results in avoidable maintenance which requires complete shut down and loss of capacity.

The next consideration is the possibility of the existing plant from the standpoint of alterations. First a study should be made of the proportions of out the front wall, or by raising the entire boiler setting. The method used will of course be dictated by space conditions; thus where floor space is available and height limited the first or second method would apply. In some installations comprising old straight tube types of boilers with bridge wall baffling, furnace volume can be increased by rearranging boiler baffles and eliminating bridge walls, thus taking advantage of the full front to back dimensions of the unit. In many cases this can be accomplished with little disturbance to existing outer walls. Finally, furnace capacity may be increased by the installation of water walls. These can the complete boiler unit to determine what factors in the design limit increasing its capacity. These for instance may be boiler drum volume, furnace volume, draft capacity or burner capacity. If the boiler drums prove to be the limiting factor and internals are not of modern design, it may be possible by installing up to date steam cleaning equipment to obtain additional capacity without exceeding present carryover. The probabilities are that in most of the older installations, drums will be found to be liberal in volume (i.e., steam relieving area) and will not prove the limiting factor.

If furnace volume is small several courses may be followed. The size of the furnace can be increased by the addition of a dutch oven, by moving be simply designed for oil and gas-fired units and quite often with slight change to existing structures. It is possible to install bare tube water wall elements over existing furnace walls provided these are not so badly deteriorated as to prevent patching with plastic or other refractory materials.

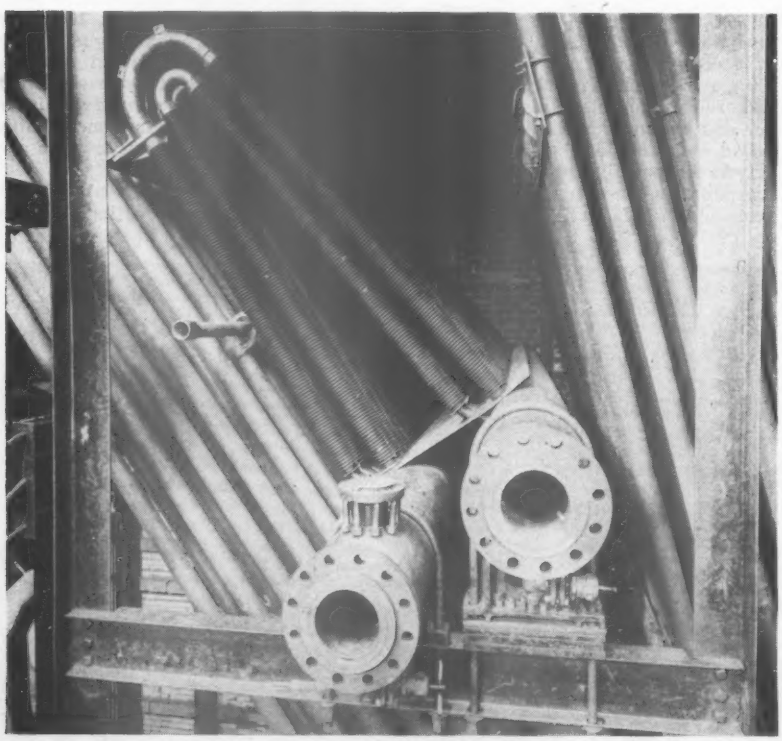
Any increase in capacity must take into consideration available draft supply. We have already mentioned the elimination of leakages and their effect on steam output. The next step is to study the ways and means of obtaining additional draft capacity. First study the arrangement of flue and duct connections with a view to eliminating restrictions of all kinds. Excessive friction losses in such connections serve no useful purpose and result only in the dissipation of draft capacity without contributing toward delivery of steam at the boiler outlet. A very successful method of reducing flue and duct losses is by the installation of guide vanes at turns.

Shortening Boiler Baffles

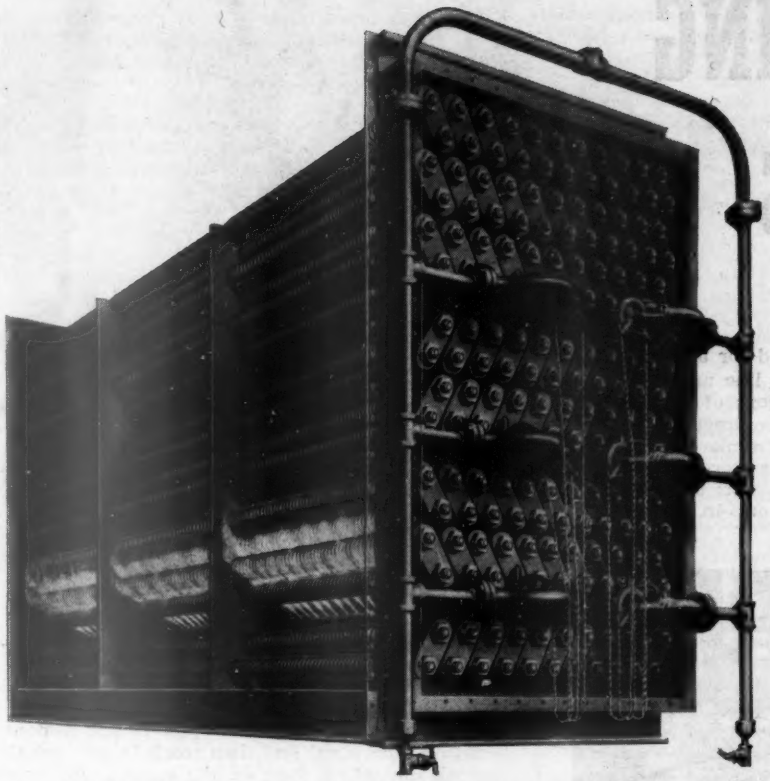
Since we are primarily striving for more steam there will be conditions under which a small sacrifice in efficiency can be tolerated in the interest of obtaining increased output with existing draft equipment. This can be accomplished by shortening boiler baffles to reduce boiler draft loss. Such procedure will of course result in increased exit gas temperatures and loss of efficiency but the additional steam output may well overbalance such loss. For units operating under natural draft an increase in stack height should be considered. Where mechanical draft equipment is being used it is often possible to install large diameter rotors to take advantage of the full capacity of the drivers, and in older installations employing slow speed fans, it is probable that fan speeds can be safely increased. This information may be obtained from the fan manufacturers. Naturally such changes will be considered only after existing mechanical draft equipment has been completely checked to determine that replacements of worn parts will not accomplish the desired results.

Increased capacity is directly dependent upon the ability to burn more fuel. This can often be accomplished by installing larger tips on oil burners, by increasing the size of ports in gas burners, by increasing gas pressures, by increasing air pressures and in the case of natural draft units by providing for increased furnace draft. In many cases it will be found feasible to install additional burners. Where the foregoing alterations prove inadequate or if space conditions are limited, additional capacity can be obtained by the employment of integral fan-type burners.

One serious source of loss is the condensation of steam in long pipe lines such as exist in the refinery. Although the use of superheat may not be required or even be desirable in process equipment, the installation



Convection-type superheater installed between the banks of a bent-tube boiler



Phantom drawing of extended surface economizer showing arrangement of support plates, heating surface, connecting headers and soot blowers. All of the casing is removed except the steel channel which form the edges of end enclosure

of superheaters to add from 50° to 75° superheat can, in many cases, be justified under present conditions. The reduction of condensation losses and delivery of practically dry vapor to process steam users will materially relieve the demand on the boiler plant. The demand of steam-driven auxiliaries in the boiler house itself will also be reduced by the addition of superheat and in most cases such auxiliary drives are capable of handling an increase in steam temperature of the above order.

Another limit on capacity can be charged to failure to utilize waste heat in flue gases and there are numerous installations operating without heat-recovery equipment. It is true that under normal conditions there are many cases where such equipment cannot be justified from the standpoint of economic return due to low fuel costs, but we are today concerned primarily with the problem of obtaining capacity with a minimum outlay of critical materials. Therefore, before installing complete new units a study should be made of the advantages to be obtained by the installation of economizers. In this connection it should be kept in mind that the addition of heat-recovery equipment requires the installation of mechanical draft which can be selected with sufficient capacity to operate the boiler unit proper at considerably higher ratings, assuming that the limiting factors previously discussed so permit. Thus the study of the proportions of the existing unit, combined with the application of heat-recovery equipment, can very well supply the key to additional capacity with a minimum new-materials requirement.

At this point it should also be remembered that capacity can be increased by the recovery of heat in boiler blowdown through the use of heat exchangers which raise the temperature of the incoming feed water. This can be an appreciable item when feed concentration is high and consequent blowdown must be large to maintain allowable boiler-water concentrations.

There is a further source of steam capacity from waste heat which has been described in recent publications and which deserves attention.* This has to do with the combination of direct-fired oil stills and waste-heat boilers, the latter being equipped with independent burners for separate operation when the stills are out of service. If necessary, a balance can be maintained by simultaneous firing of both still and boiler burners to make the combined installation entirely self-supporting from the standpoint of steam requirements. Designs have also been advanced in which oil heating and steam-producing surfaces are installed in the same furnace, thus eliminating the necessity for a double structure. Such a unit has the advantage of savings in cost as well as materials and by the proper disposition of the oil-heating and steam-producing tubes permits operation at efficiencies comparable to good boiler practice.

Any program to maintain existing equipment operating at maximum continuous capacity and efficiency requiries that means be provided to keep the operators constantly informed of operating conditions to avoid erratic control. We are not discussing or recommending continuous overloading, which will sooner or later result in forced shutdowns, but operation at a maximum safe continuous load as determined by careful analysis of the capabilities of the equipment on hand. Under these conditions, however, the usual margin between continuous and peak loads is reduced and the operator must be provided with a complement of instruments which will enable him to have full knowledge of flows, pressures, temperatures, draft conditions and water level at all times.

*"More Steam With Minimum Materials," by Pell W. Foster, Jr., vice president Foster Wheeler Corp., Petroleum Refiner, Sept. 1942.

Cement-Lined Pipe Useful In Corrosion Areas

BECAUSE of highly corrosive conditions present in certain areas, corrosion from waters used for water flooding, and shortage of steel for tubular goods, cement lining of used pipe is becoming more and more useful.

At the present time, cement lining of used pipe is being practiced principally in Oklahoma where three plants are now operating. After the pipe is delivered to the plant for lining, it is first thoroughly cleaned removing all paraffin, oil, etc., generally by burning. It is important that the surface of the pipe be cleaned, otherwise the cement will not hold. Any pipe that is badly pitted in places is spot-welded, cement-lined, and then used for low-pressure work. As a rule, new pipe to be used in waterflooding projects in the Mid-Continent area is now cement-lined before installation thereby eliminating future corrosion problems.

The plants are equipped to handle various size pipe as well as fittings. When the operator supplies his own pipe, the prices for lining the pipe, including cleaning, etc., will range approximately as follows:

Size (in.)	Cost per ft. (cents)
1½	0.065
2	0.08
2½	0.10
3	0.12
4	0.16
6¼	0.25

OPERATING IDEAS

Support for Wire-Line Reel

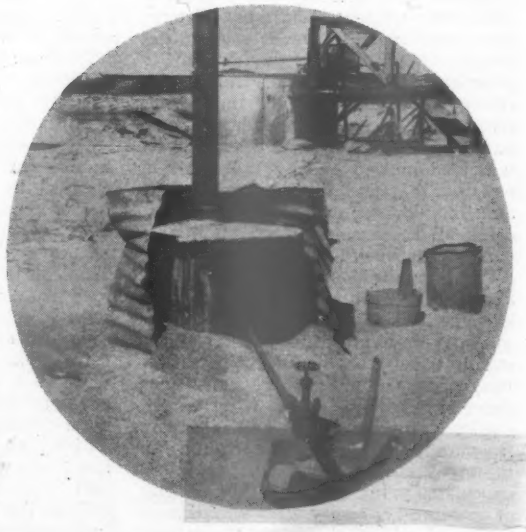
ON most deep wells, the wire rope used for a rotary drilling line is bought extra long so the line may be pulled over in small increments and the positions of concentrated wear on the line changed. One drilling contractor in a West Texas field uses frames made from old tubular material for supporting the reel on which the line is stored. These are built in the shape of an inverted V with short pieces of pipe about 1-ft. long for feet. A short length of 4-in. pipe is used for an axle.

Adjustable Flow Line Supports

GETTING this flow line in place and at the proper elevation is a simple matter with the special adjustable supports shown in the photograph. These consist of a heavy-duty truck jack welded to a piece of pipe supported by a frame and equipped with a saddle on the head. These are placed under the flow line at about 30-ft. intervals and the line coupled together with low-pressure couplings. The line, or any portion of it, can be raised or lowered as desired.

Foot-Opening Lid on Dope Bucket

THIS special container for the thread dope used on drill-pipe tool joints includes a lid which is operated by a foot pedal. The pipe racker has only to depress the pedal and then reach in and get the desired amount of dope on the small paint brush used for applying the lubricant. The lid prevents mud and water from getting into the thread dope.



Stove for Drying Cuttings

THIS special stove is used for drying cuttings caught on a rig drilling a deep hole in West Texas. It is made from old steel plate with a top about 2 ft. in diameter which permits the cuttings to be spread out so they will dry rapidly. Old sheet metal prevents the wind from blowing the cuttings away. The half nail barrels are used as buckets in catching and washing samples.

The Principle of the

Safety Cylinder as an Explosion Preventer In Air-Gas Compression*

by Frederick Squires†

An ever-present danger in repressuring depleted oil reservoirs with air-gas mixtures is that they may explode in the compressors and lines when present in certain proportions. This article describes a safety cylinder which is used for the detection of explosive mixtures and presents methods of preventing dangerous and costly accidents.

THE dangerous shortage of crude-oil stocks due to war consumption in addition to domestic needs has turned the attention of the industry as never before to the necessity of increasing the supply. This can be done in only two ways, finding new fields and increasing the production of the old fields.

There is a probability, although no certainty, of finding new production, but increases from the old fields by secondary recovery is sure. This is already attracting more attention than ever in the past.

Technologists have greatly improved the methods of secondary recovery and it is toward removal of one of the remaining difficulties experienced in repressuring that this experiment is directed.

Secondary recovery by injection of mixtures of air and gas into oil sands involves danger of surface explosions. Since gas is depleted sooner than oil and since most gas drives have been confined to old producing properties, the principal problem has been to obtain an adequate supply of gas for the pressure medium and fuel for the compressor and pumping engines. This problem is usually met by making up the gas deficit of the pressure medium with air. This practice often results in explosions in the compressors and lines after the mixture of air and natural gas has reached the explosive range.

There are several ways to overcome the difficulty. The most usual, which is only temporary, is to use two separate compressors, one of which delivers natural gas only and the second air only, the mixture taking place at the injection wells or at points in the pressure lines far distant from the plant. In these cases the danger is not entirely eliminated because air dilutes the gas in the sand. Even before this happens the gas may be gathered by a vacuum on the oil-producing wells, and even in the best vacuum systems, leakage aboveground dilutes the gas with air. Gasoline plant operators try to avoid leakage of air into vacuum gathering lines because added pressure on the gas-air mixture is necessary to keep up the optimum pressure on the gas itself. When gasoline yield is of minor importance, as is usually the case in repressuring operations, less care is used to eliminate air leakage; this results in enough dilution to present a constant danger of explosion.

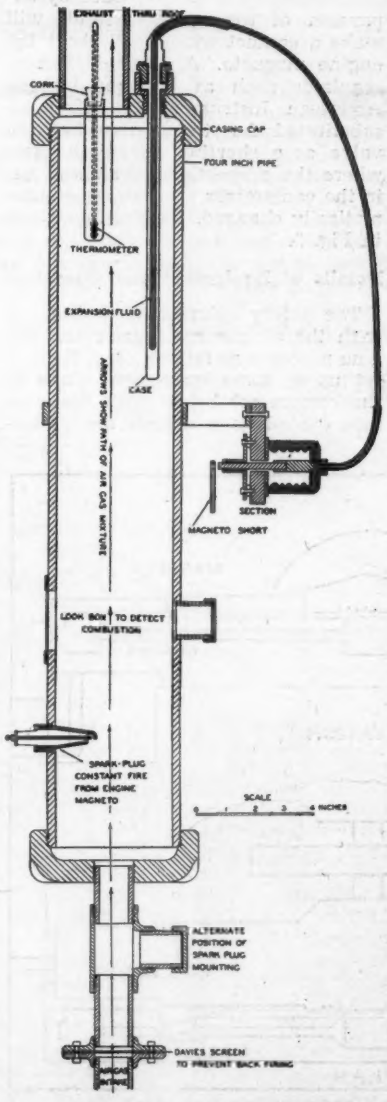


Fig. 1—Scale section of safety cylinder

A second method used to overcome the danger is to test the amount of oxygen in the gas supply to the compressor by means of an Orsat analyzer and to keep the air-gas mixture outside the explosive limit. This is of course an expensive precaution and one which requires greater technical skill than is usually available in the field.

The use of air alone presents the difficulties of too great dilution of the pressure medium and of the fuel gas so that it cannot be used in the engines. Gas is usually too scarce in depleted fields to be used alone and is too expensive to purchase from gas lines. The use of all the available lease gas plus enough air to provide an adequate volume for recycling (after taking the gas needed for fuel) has proved to be a practical expedient. The problem involved is the danger of exploding the mixture, and it was to provide a simple, cheap, and effective preventive against such a danger that this study was undertaken.

Analogous Methods of Control in Industry

There are several highly technical devices dependent on constant regular electric current which would solve the problem, were it not for

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†Peroleum Engineer, Illinois State Geological Survey, Urbana.

the skill required to install and operate them and the lack of dependable electric current at most of the compressor plants. To be of use in the oil field, especially when the field has reached the low productivity usual before secondary recovery is adopted, any device must be simple. Highly trained technicians are not available because the narrow margin of profit does not permit their employment. All operations, to be successful, must be within the skill of the average field man.

The simplest test of whether a mixture of air and gas will explode is to try to burn it. Up to 500 lb. per sq. in., pressure does not affect ignition. The working of the apparatus presented in this paper depends on these two principles. It is presented in the hope that engineers who are familiar with secondary recovery will test and perfect the device to the point where any pumper can build and operate one.

The older Packard cars were equipped with means for drawing off a part of the air-gas mixture from the carburetor and passing it against the constant fire of a spark plug, which ignited the air-gas mixture, the hot products of combustion being drawn into the engine cylinders with the unburned air-gas mixture from the carburetor. Such an ignition of the air-gas mixture is the method used in the safety device.

Suggested Equipment

In the drawing (Fig. 1) is shown a section of 4-in. pipe provided at each end with a casing cap. This is called the "safety cylinder." Into the bottom cap is screwed two sections of 1-in. pipe that are connected by a flanged coupling. Between the flanges is a Davies wire screen, to avoid backfiring into the compressor. Through the side of the safety cylinder is inserted an extra long spark plug. (An alternate position for the plug is in the elbow on the 1-in. pipe below the safety cylinder.) Above is a "look box" through which the operator can see what is going on in the way of combustion. The upper casing cap is drilled and threaded for a 2-in. open end exhaust pipe, a thermometer well, and the tube at the end of a sylphon valve. A Fulton sylphon valve is a device to operate a switch by means of temperature changes. (See Fig. 1.) The remainder of the sylphon valve is supported by a metal band encircling the safety cylinder in a position such that the plunger attached to the accordion part of the sylphon, when forced outward by expansion of the sylphon fluid, will make a contact which will short the engine magneto. A bimetal thermoregulator such as is made by the American Instrument Co. may be substituted for the Fulton sylphon valve as a shorting device in cases where the proportions of air and gas in the compressor are not to be automatically changed. This is illustrated in Fig. 3.

Details of Equipment and Operation

The safety cylinder is hooked up with the air-gas compressor and engine magneto as follows (Fig. 2): It is set up at some convenient place in the compressor house with the vent pipe extending to outside air, preferably through the roof. A wire is run from the compressor engine magneto to the spark plug on the cylinder. A second wire runs from the shorting mechanism opposite the plunger of the sylphon valve back to the same magneto.

From the compressor discharge line is run a small pipe to the intake of the safety cylinder. This pipe has a valve so that the volume going through it may be reduced to only a small amount of the air-gas mixture at pressure just above atmospheric. The protection operation is as follows: All the while the compressor is running, a small stream of the air-gas mixture is going through the safety cylinder past the hot spark plug, up and out of the exhaust outlet. Whenever this mixture reaches

(Continued on Page 93)

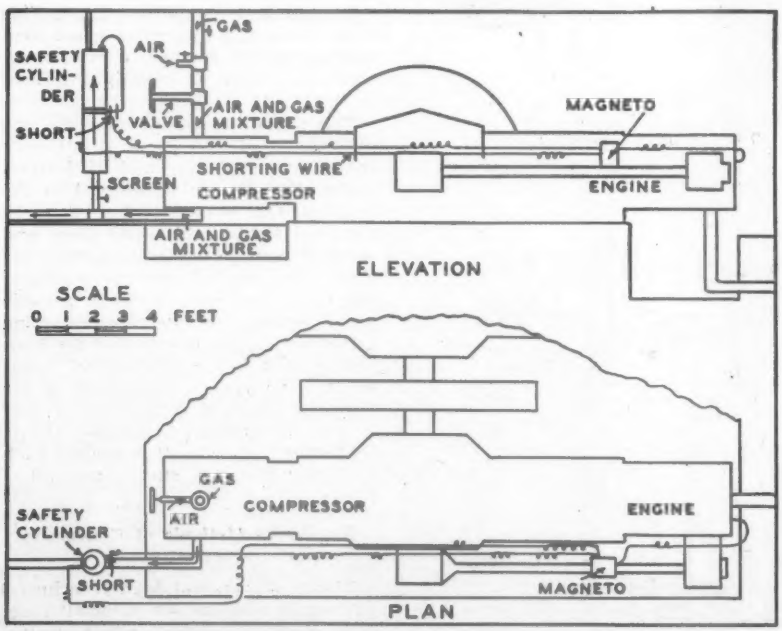


Fig. 2—General layout of the compressor and safety cylinder showing wiring

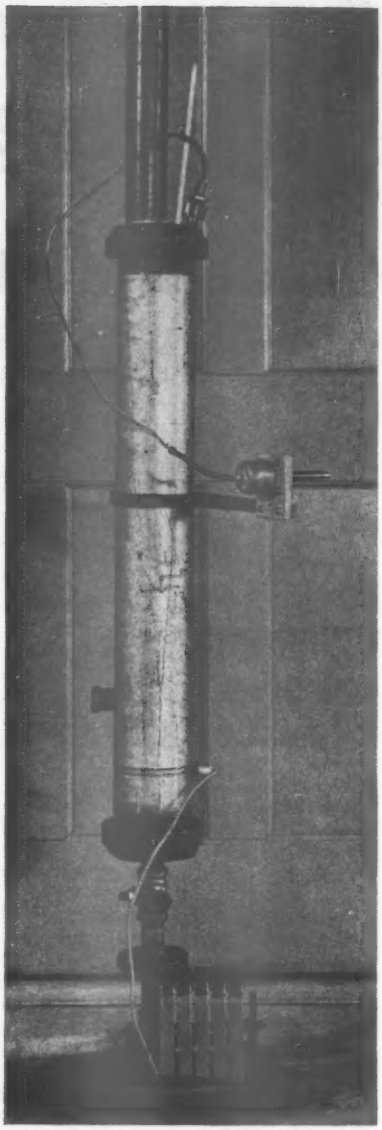


Fig. 3—Photograph of full-size model

Pipe-Line Terminal Practices Effect Noteworthy Economies

by Paul Reed

Several practices are discussed which have been observed at a large pipe-line terminal for expediting work connected with repair of lines and the keeping of useful records for operating and engineering staffs.

ECONOMICAL pipe-line operation and maintenance is achieved by adoption of routine procedures and standard equipment of demonstrated effectiveness. But organizations bent on raising the standard of efficiency are constantly seeking means for improving the details of established practices. In some cases the dollar-and-cents value of a new method is immediately apparent, but frequently the change is one which contributes in a general way to the capable handling of operations in a way that is hard to trace. When these involve the transportation of 100,000 to 200,000 bbl. daily and the storage of several times this amount, it frequently happens that factors which are small details in themselves may effect savings amounting to thousands of dollars in the course of a year.

Some of the features of the operation of an important pipe-line terminal of Humble Pipe Line Co. with pump station, storage facilities and lines in the adjacent area are being presented to show what is being done by a major system. An article entitled "Improved Practices Employed by Humble Pipe-Line System," by Paul Reed appeared in the September 24, 1942, issue, page 92, which dealt with other aspects of the same subject.

Routine as well as improvements in details will be discussed.

From experience all pipe-line organizations have found that the manner in which repairs are reported is important for all departments. When leaks occur, the first report is made by the man supervising the work which can be made out quickly on a mineographed form, by indicating the nature of failure and repairs by check marks in appropriate squares. Location of the failure is indicated by referring to the oil line diagram and finishing the diagram or drawing a sketch. Distance of failure from some gate valve or other fitting on the diagram must be shown, also dates of failure and repair. A telegraphic form furnishes minimum information needed by the right-of-way and claim, oil accounting and pipe-line dispatching departments of the central office as well as the division superintendent, district foreman and chief engineer.

More complete data is furnished on the printed form of the engineer's report, designated as line failure and repair report. In addition to giving location of trouble, amount, kind and disposition of lost oil, property damage, type of soil topography and temporary repairs, the report goes into details regarding the condition of the pipe and the nature of the permanent repairs. At one of the large terminals a special set of records is kept showing the permanent status of all lines and repairs in the vicinity, from which the engineering department of the company can be advised.

Company-Devised Equipment

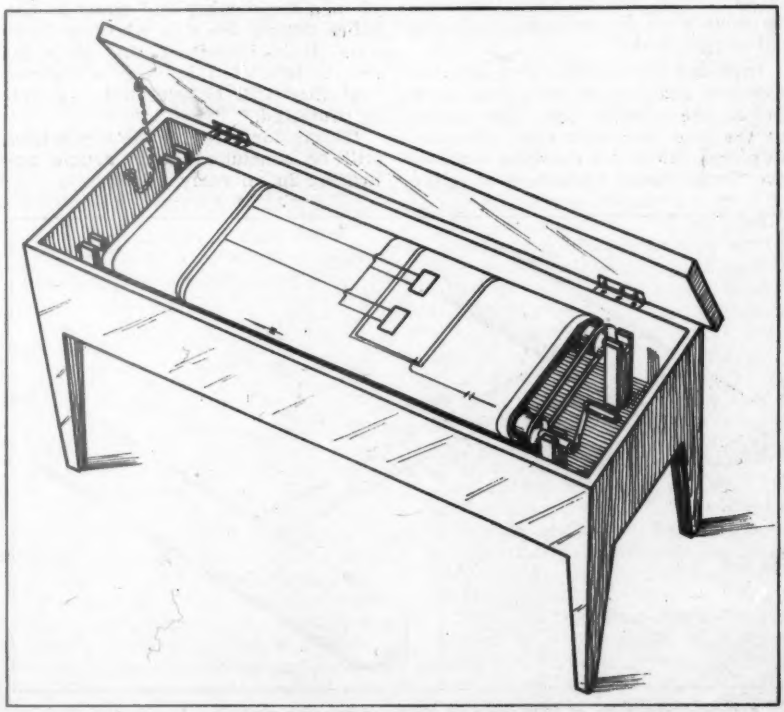
Repairs are effected according to procedures which are generally used by pipe-line companies. Some of the features which involve tools and equipment devised by the company are mentioned here.

When a hot spot on the line has been located, badly corroded pipe may be taken out for a distance of 100 to 200 ft. The open ends of the line are plugged off with rubber plugs before they are capped with a flanged device.

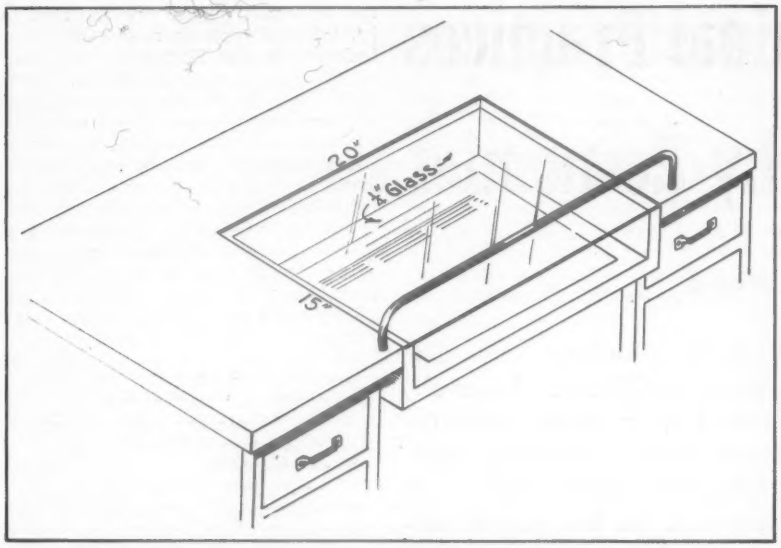
For temporarily plugging a cut or broken line, sometimes a ramrod is used for tamping mud in the line which has been cut. This ramrod has been fabricated by welding. This takes the place of the mope pole which has been customary in the past. In closing up the end of an 8-in. pipe, 6 ft. of mud near the opening is usually sufficient unless the oil is under unusual pressure.

To pull mud out of a line which has been put in to stop up the ends of the pipe, a disk is made from scraper material, to which a link is attached which may be pulled by a chain. A rope is usually not strong enough for this purpose.

A device used for holding patches on pipe while they are welded in place is a 12-ton hydraulic jack of a type used for trucks to which is attached a chain with links of the kind used for chain tongs. The base for the jack consists of part of a 10-in. threaded collar. In welding patches



Map case for pipe-line terminal office



Data of daily tank gages of pipe-line terminal are recorded on card slipped under glass covering recess in table of terminal office. Glass is protected by brass rail

on pipe, the jack is placed on top of the patch, the chain is wrapped around the pipe and fastened to the jack. The patch is held tightly to the pipe by tightening the chain by means of the jack. This takes the place of heavy C clamps.

To eliminate the shearing effect of the teeth of conventional chain tongs an effort has been made to avoid this by the use of chain tongs which have an eccentric friction hold. The shearing effect has resulted in trouble for high-pressure lines since electrolysis develops where mill scale is broken.

Modern tapping equipment has saved a great deal of time which was taken by the older methods. A special trailer has been made for carrying the large steel box holding equipment for tapping lines under pressure. The trailer is equipped with two fire extinguishers.

A conventional air compressor, operating at 125-lb. pressure used for tapping machine equipment, as well as for moving a scraper during the evacuating of a line is mounted on a special skid, the foundation of which is made of compressed air tanks which are used as reservoirs. With the use of these tanks, it is possible to remove condensate; they provide a reserve capacity which makes it possible to have more even flow of compressed air. These tanks are made 10 in. in diameter. At the end of each tank is a fitting to which cable or chain can be attached when it is being dragged over the ground. The company has found it saved money by building this unit in its own shop. The unit is convenient for use on barge as well as on land.

Air-compressor equipment is used in connection with field operations in two ways. In addition to being used for operating equipment for tapping lines under pressure, it is also used for evacuating lines which are going to be taken up. In taking up lines which have been laid across bayous and other bodies of water along the gulf, the use of air for this purpose has special advantages. In emptying such lines, the practice followed by the company is to push oil out of the line by water; the water is followed by compressed air, pushing a scraper which completely empties the line.

New lines are usually tested by water pressure. However, when a line is laid under water the testing may be done with air in order to locate submerged leaks.

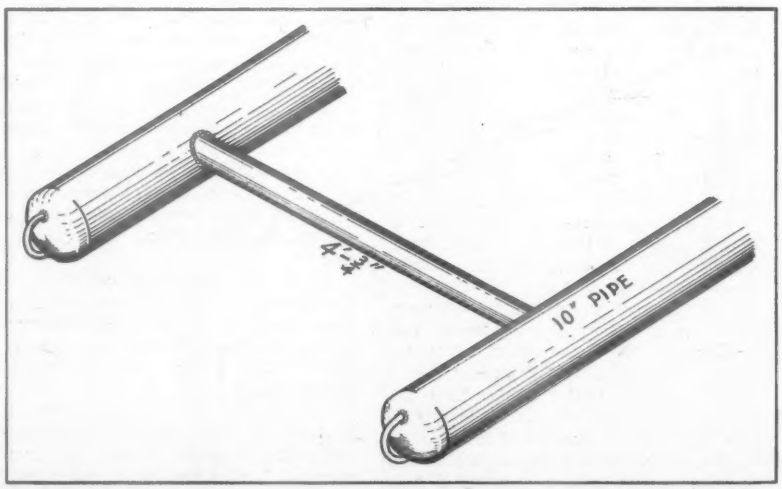
In laying a line across a bayou, it is common practice to jet out a ditch before the pipe is laid. The action of the tide soon silts over the pipe. In places where it is doubtful whether the ditch would remain open while the pipe is being laid, the pipe line is laid first and a ditch is jetted alongside of it into which the pipe line is dropped.

In taking up a line across a bayou, the company makes a practice of doing the work with its own organization. Suction, due to the burying of the line under the mud, may have to be broken by pulling the line up by means of side-boom tractors, mounted on barges.

Some convenient gadgets are used in the office of a large pump station. The chief engineer has installed a roller map horizontally in a stand which is placed close to the wall. This can be protected by a wooden cover folding down over it which is sufficiently substantial for men to sit on or to place equipment on. On the inside of the cover is a chart showing the location of service lines on the company's grounds. When repairs are being made, they are marked in red on the map.

For keeping track of stock oil recorded at 7 a.m. each day a card is placed in the office which may be examined conveniently by all gagers. This is made of Masonite which is covered with an enamel finish; from this glossy surface pencil marks can be erased at the end of each day. This card is ruled and marked with designations for columns in which figures can be placed in pencil showing the status of oil stocks in storage. This card is placed under a glass plate set in a table in the office. Across the glass is a brass rail, preventing leaning or sitting on the glass, which might break it. Since quite a number of men are coming and going in the office during the day who use these data, it is important that they be clearly tabulated in such a manner that they will be accessible as well as protected.

(Discussion of Humble's practices will be concluded in an article appearing in an early issue.)



Air chambers made of 10-in. pipe on which compressor equipment is mounted. Steel loops installed at the ends facilitate dragging the unit on trucks and barges

Induction Motor-Generator Finds Many Uses in Refineries

*by W. H. Stueve**

THE ordinary induction motor supplied with electric energy from an outside source will operate and deliver a certain amount of shaft power for utilization in mechanical drives for pumps, compressors, and conveyors of various types necessary for operations in oil refineries.

Ordinarily an induction motor wound with four magnetic poles supplied with 60-cycle power will rotate at 1,760 r.p.m. or it is said to have about 2 per cent slip or 40 r.p.m. less, at full load, than the synchronous speed of 1,800 r.p.m. Similarly, if the motor is designed with two magnetic poles (the minimum possible number) and it is supplied with 60-cycle power, its shaft will rotate about 3,540 r.p.m. or 60 r.p.m. less than its synchronous speed of 3,600 r.p.m., and it is said to have about 2 per cent slip.

Efficiency of Motor

The electric input from the outside source, as measured by the conventional kilowatt metering equipment, will record the effective work performed by the motor shaft plus the electric losses in the windings of the motor, plus the mechanical friction losses in the bearings, plus the mechanical windage losses produced by the rotating element known as the rotor. These losses usually approximate 7 to 10 per cent, depending on the design speed, in that commercial motors of higher speeds have inherent smaller internal losses and generally are said to be of greater relative efficiency. The outside source of power supplied to the induction motor, however, from a capacity standpoint, is considered in terms of volt-amperes, and this product of volts times amperes (kilovolt-amperes) is greater by 7 to 10 per cent than the work done, expressed as kilowatts, in the conventional induction motor.

This ratio of kilowatts to kilovolt-amperes is termed power factor and is always less than unity, or if expressed in per cent, the power factor of an induction motor is less than 100 per cent, usually of the order of 93 to 90 per cent at full shaft load.

The conventional induction motor can be turned into a generator provided it is operated by some form of prime mover at speeds slightly in excess of its synchronous speed. Thus, if a four-pole 60-cycle induction motor, having a synchronous speed of 1,800 r.p.m., will operate as a motor at 1,760 r.p.m. if fully loaded, but if it is operated at 4 or 5 per cent above its synchronous speed of 1,800 r.p.m., or from 1,875 to 1,890 r.p.m., it will deliver its full rated shaft power to the power system in the form of generated energy, depending on the electrical design of the induction motor.

In this case of the conventional commercial induction motor the magnetizing current or wattless current, expressed in kilovolt-amperes, amounts to 40 to 50 per cent of the full-load rating of the motor expressed in kilovolt-amperes. By special design, however, an induction generator can be constructed whch will deliver its full load in kilowatts back to the power system from which it obtains its magnetizing energy with only a 1 per cent increase above its synchronous speed.

Use of Motor Generator

In the recent installations of the Houdry process in oil refineries, the above characteristics of the induction motor-generator are taken advantage of due to the following:

(a) Quantities of heated air and flue gases are available, which fluctuate in volume over short periods of time, but contain sufficient heat (950° to 1,000° F.) to produce rotative energy if stabilized and then passed through a turbine designed somewhat similar to a steam turbine.

(b) Quantities of relatively low-pressure (45 lb.) compressor air are required in the refining process, about 1.2 cu. ft. per minute per barrel of daily charge.

(c) Electric energy is available from an outside source, either purchased from utilities or privately generated in the refinery electric plants to provide magnetizing current and/or power supply.

Thus we find that the above conditions (a), (b), and (c), in refineries using the Houdry process, fit into a plan to utilize the heat absorbed by compressed air being used to regenerate the catalyst in the process with the aid of the a.c. electric induction generator to act as a speed governor on the heated air (gas) turbine and thereby stabilize the flow of the needed air delivery.

In a certain oil refinery having the Houdry process installed, capable of processing 20,000 bbl. of crude oil per day, the following equipment was installed, from left to right in the photograph, Fig. 1:

1. A gas turbine capable of developing 3,800 hp. at 6,050 r.p.m. taking 40,000 c.f.m. of heated air and flue gases at 38 lb. gage, at 950° F. maximum.

2. Axial air compressor discharging 23,000 c.f.m. at 45 lb. gage and rotating at same speed as the gas turbine at 6,050 r.p.m.

3. Herringbone reduction gear with a ratio of 3.345 to reduce the gas turbine speed from 6,050 to 1,818 r.p.m. or 6.022 r.p.m. to 1,800 r.p.m. the synchronous speed of the attached induction generator.

4. A flexible coupling connecting the low-speed shaft of the herringbone gear (3) to the shaft of the induction generator.

5. A 600-kw. induction generator rated to deliver its full output at 1,818 r.p.m., or as an induction motor of 800 hp., when supplied with 2,300 volts, 163 amp. per phase at 60 cycles at 92 per cent power factor.

6. At the extreme right end (Fig. 1) is a 200-hp. steam turbine, to be supplied with 125 lb. gage, steam, and atmospheric exhaust to operate at 720 r.p.m. maximum speed, used to start the turbine-axial flow compressor.

Generator Converted to Motor

In the regular operating cycle, when the 200-hp. steam turbine reaches its maximum speed of 720 r.p.m., it is automatically disengaged, and the 600-kw. induction generator (5) is available at that time, acting as an induction motor, to bring the entire unit—gas turbine (1) and (2) axial air compressor—up to almost full speed. Then when the amount of heated air available increases slightly the speed of the gas turbine increases slightly causing the induction motor speed to increase beyond its synchronous speed of 1,800 r.p.m. and there-

*Oklahoma Gas & Electric Co., Oklahoma City, Okla.

by becomes an induction generator.

Thus, it may be said that the induction generator acts primarily as a governor to maintain a somewhat steady flow of compressed air for the regeneration of the catalyst. Due to cyclical changes in operation of the Houdry catalytic process, temperatures and volume of heated air will vary continually, and as the amount of such hot gases increase, the tendency would be for the turbine to increase its speed but the induction generator would act as a drag to hold down the speed, and conversely should the volume of heated air decrease considerably, the induction generator would then become a motor with its speed fixed at 1,760 r.p.m., thereby permitting the axial air compressor to operate at somewhere near its full output-design speed.

The amount of electric power actually generated and pumped back into the utility or refinery plant system by the induction generator in reality is very small, since the unit fluctuates between speeds corresponding to 1,800 to 1,806 r.p.m. over a 10-minute cycle, providing generated power of from 0 kw. to 250 kw., respectively, or an average of perhaps 125 kw.-hr. per hour can be actually generated.

In order to further stabilize the speed of the gas turbine and consequently the output of the axial air compressor, two oil-fired auxiliary furnaces are provided on a level immediately above the intake of the heated air (gas) turbine.

These furnaces are automatically controlled to enable hot flue gases to be added to the heated air obtained from the refinery catalytic regeneration process. The flue gases so added to the heated air are not provided for makeup principally, but mainly for the purpose of maintaining and insuring that power will be generated in small amounts at all times to prevent reverse strains on the couplings. Thus, with the shaft from the turbine end continually working on the generator shaft, instead of the generator picking up load and attempting to turn the turbine, any play or lost motion in the couplings is taken up in the same direction of rotation.

More Power

It is contemplated that as the catalyst used in the Houdry process ages and requires more heat for regeneration that more waste heated air will be available to operate the turbine, and consequently the possibility of reaching higher speeds up to 1,818 r.p.m. and, therefore, more power will be generated by the induction generator.

This situation of having excess air available, however, can be compensated for to some extent by reducing the amount of oil fired in the furnaces located immediately above the intake supply for the heated air to the gas turbine.

While the compressed air in passing through the catalyst cases occasions some pressure drop, 45 lb. down to 38 lb., the burning operation of regeneration of the catalytic agent heats the air sufficiently to enable it to produce enough power to compress the required amount of air originally.

These regeneration gases passed through the turbine vary considerably in composition, being rich in CO_2 and poor in O_2 at the beginning, then poor in CO_2 and rich in O_2 at the end of regeneration.

Socony-Vacuum Oil Co., Inc., and Magnolia Petroleum Co. installed gas turbines and axial compressors connected to induction generators in eight of their refineries, principally of the type described herein, with the turbine of 3,800 hp. and generator of 600-kw. capacity.

One of the first refineries to accept the Houdry process was Sun Oil Co., and the gas turbine-axial air compressors were installed in three of their plants.

Since they desired greater use and capacity of the Houdry process, larger units were installed of 7,000 hp. for the gas turbine and 1,200 kw. for the induction generator.

BOOK REVIEW

The Geology of the Southern Part of Morton County, North Dakota. By Wilson M. Laird and Robert H. Mitchell, Geological Survey of North Dakota, Grand Forks, N. D. 42 pages.

Includes a structure contour map of the top of the Hell Creek, Upper Cretaceous formation.

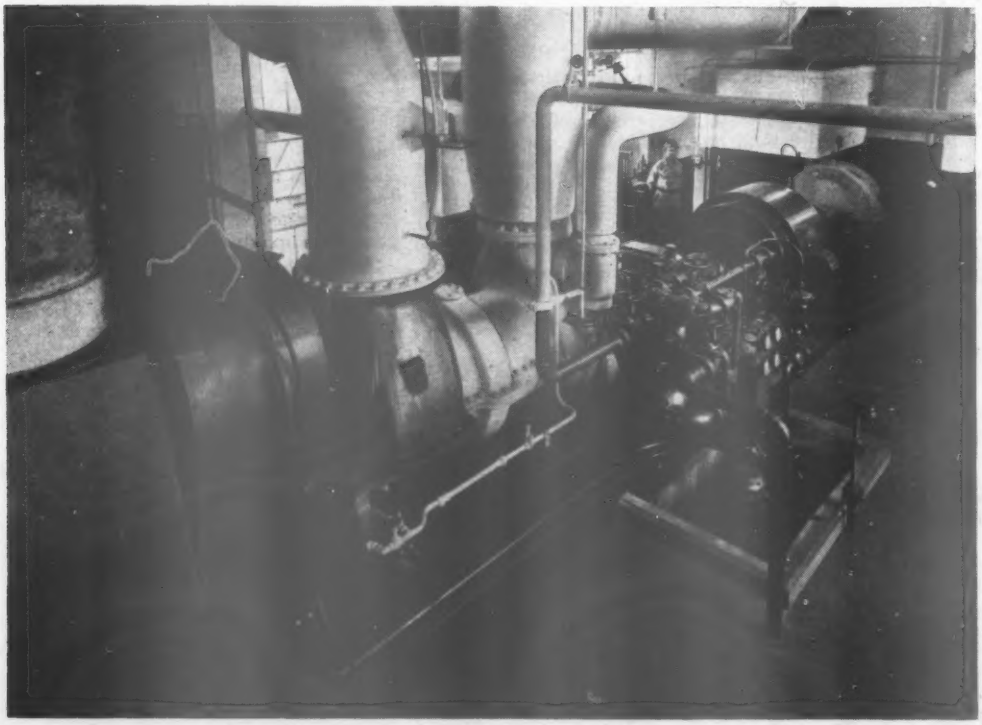


Fig. 1—Installation in Houdry plant showing use of electric induction generator as speed governor to maintain steady flow of compressed air for catalyst regeneration

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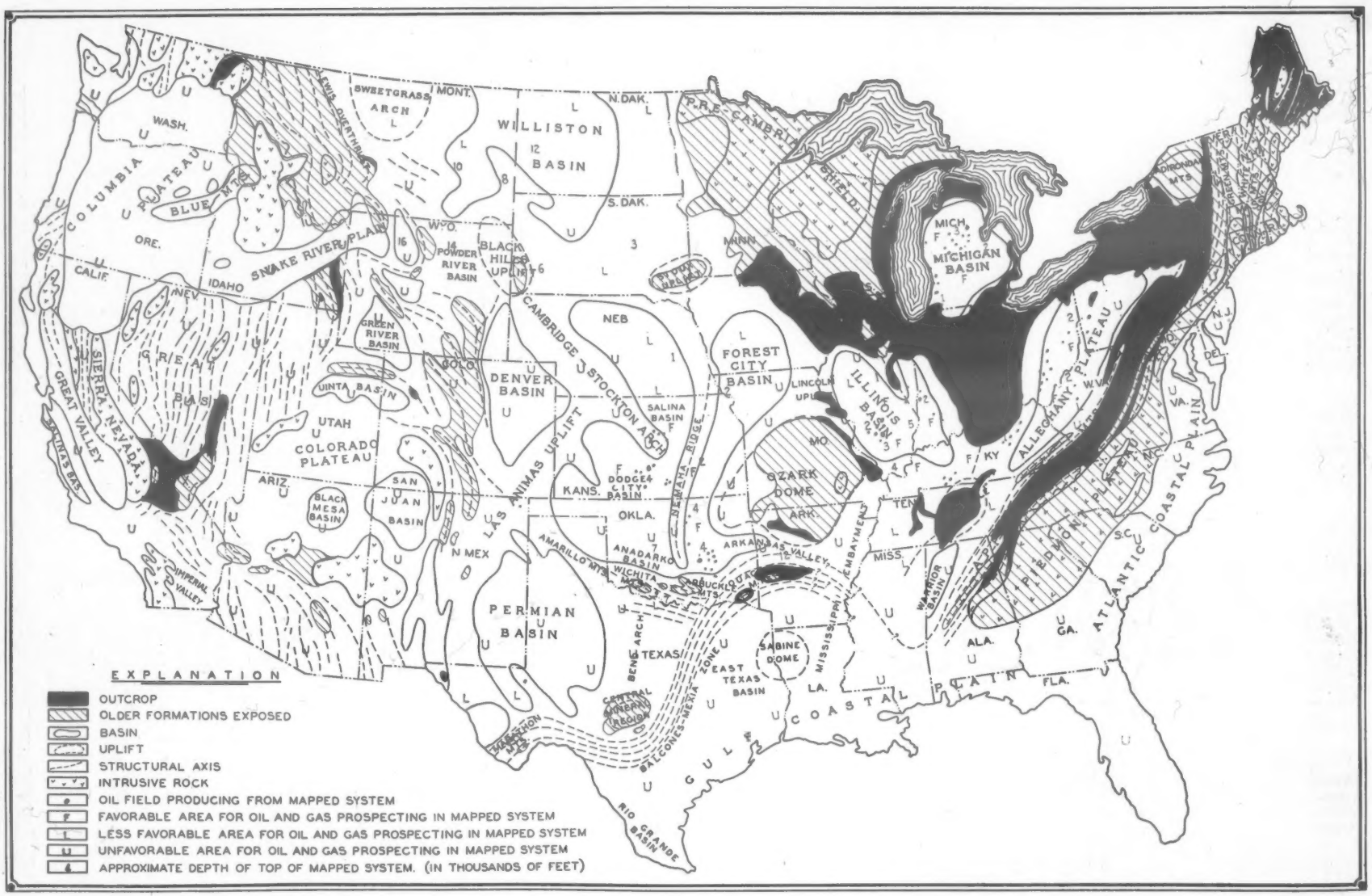
Middle Ordovician to Devonian



OIL ZONES OF THE UNITED STATES

Middle Ordovician to Devonian

(Compiled by The Oil and Gas Journal)

PRINCIPAL PRODUCING HORIZONS: The principal oil and gas pays in formations between the Middle Ordovician and Devonian, inclusive, are divisible into six groups:

Middle Ordovician limestones, Trenton and Viola.
Lower Silurian sandstones, Clinton and Medina.
Silurian and Devonian limestones, Hunton, Dundee, Traverse, Monroe and "Corniferous."
Lower Devonian sandstone, Oriskany.
Upper Devonian sandstones, Chemung and Catskill groups.
Stray sands, Misener and Hoing.

DISTRIBUTION OF PRODUCING AREAS: Production from rocks of Middle Ordovician to Devonian age covers a large area but total production from these pays is not as important as that from other major zones.

The oldest pay in this group is found in the so-called **Trenton limestone** of Ohio and Illinois and the **Viola limestone** of Oklahoma and Kansas. The most important Middle Ordovician production came from the northern part of the Cincinnati arch in Ohio and Indiana, where there was also one of the nation's largest gas fields. East of the Cincinnati arch little has been found in the Trenton although shows are reported. In Illinois the margins of the basin and some basin fields such as Salem, have produced Trenton oil. There is reason to believe that it should produce in deeper structures in the basin. In Kentucky, **Sunnybrook limestone** production is of the same age. The **Viola** has produced irregularly in the fields to the north and south of the Wichita-Arbuckle uplift and also around the south flank of the Central Kansas uplift, notably at Zenith and Peace Creek. Here it is associated with a stray wedging sand known as the **Misener sand,** the oil being found in the weathered top of the Viola and in the overlying Misener. Production in the Trenton is also in the eroded top and also locally at probable unconformities in the limestone in Ohio.

In the Allegheny Plateau region, the **Medina** produces large quantities of gas in New York and Ohio (where it is known as the **"Clinton"**). This sandy phase of the Lower Silurian is largely restricted to this area and efforts to extend production east have been generally unsuccessful. A large gas flow was found in the salt of **Salina** age in a deep test in Michigan but no further work has been done in this formation here.

As sediments accumulated in the basin which underlies the Allegheny Plateau, thick sandstones were deposited throughout the Devonian. Lying to the southeast of the "Clinton" area are **Oriskany** gas reservoirs of Lower Devonian age and these sands have produced oil locally. On approaching the deeper parts of the basin, the pays become successively higher in the section with sandstones of **Chemung** age producing large quantities of oil at Bradford and others of **Catskill** age in southern Pennsylvania and parts of West Virginia. Over a large part of the area, however, these sands grade into a thick brown shale series with some thin sands and less chance for sustained oil production.

The most widespread pay horizons of Silurian and Devonian age are limestones. They provide the great bulk of Michigan's production with three principal pays, the **Traverse, Dundee** and **Monroe limestones** of Lower and Middle Devonian age. Present production is along a northeast-southwest belt traversed by lines of folding among which exploration is gradually being pushed to the northwest. Production tends to fall off rapidly in these pays as in equivalents elsewhere in the United States but the reservoirs are long-lived at low rates of production. The principal pay in Central Kentucky is the **"Corniferous"** formerly considered of Onondagan age. It is now known that some porosity is found in later formations and some of the pay section is in the **Niagaran,** of Middle Silurian age. This formation made up of members separated by unconformities extends into Oklahoma where it is known as the **Hunton,** and is a fair producer. Good Devonian production is found around the margins of the Illinois basin with probably the most important possibilities for new fields of this age on deeper structures in the basin. The **Hoing sand,** associated with Devonian limestone is found only in northwestern Illinois.

Recently Silurian limestone has been found productive in Ward County, Texas, indicating possibilities of further extension to the west and southwest.

EXTENSION INTO OTHER AREAS: Uplifts during the late Ordovician continuing through the Devonian either prevented the deposition of Middle Ordovician to Devonian strata over them or else permitted the removal of the material that was so deposited. There is, thus, little opportunity of finding production in these pays over the Bend arch and the West Texas highs. Extensions of Viola production and introduction of Devonian pays may be found to the northwest of the eastern Kansas producing area and in the basins of Kansas and Oklahoma. In the Rocky Mountain states, the Jefferson limestone, of Devonian age, has shown some oil but is not yet a commercial producer. In the coastal areas, the Paleozoic formations are too deep and intense fracturing accompanied by volcanic intrusions and some folding makes them doubtful producers in the Cordilleran region.

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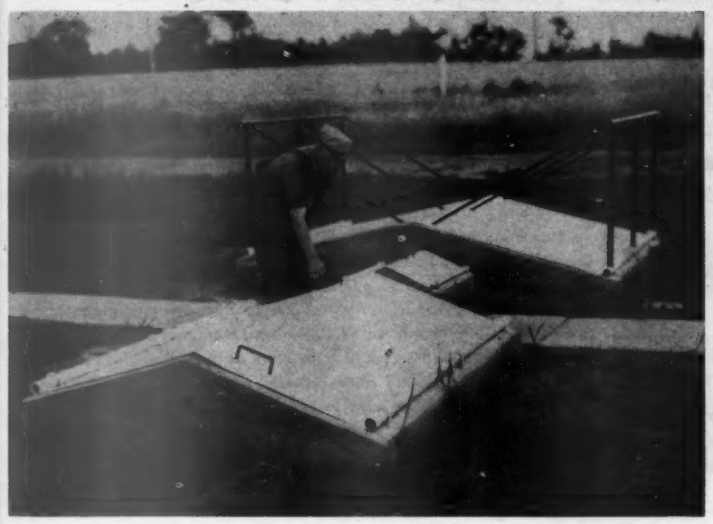
Seismograph Service Corporation

CONSULTING EXPLORATION GEOPHYSICISTS

KENNEDY BUILDING

TULSA, OKLAHOMA, U. S. A.

PIPE-LINE SUGGESTIONS



Handles for Opening Gate-Valve Covers

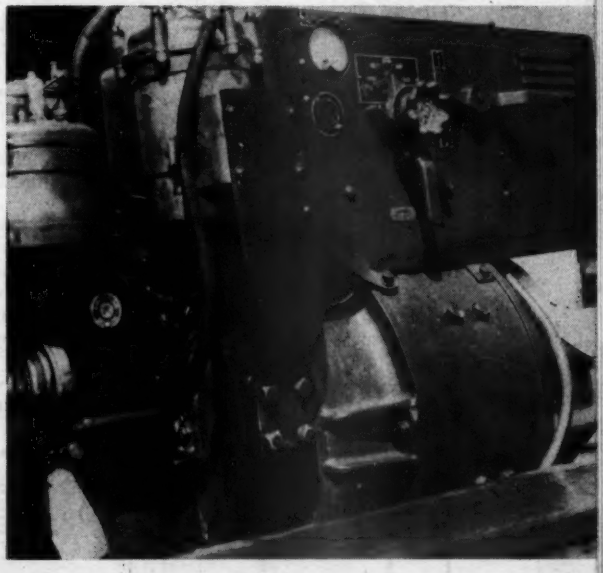
THE opening and closing of covers to boxes enclosing main-line gate valves at a compressor station has been made easier and safer by special handles. One type of handle (in the rear) for this purpose is made of a framework, enabling operators to handle opening and closing of the covers while they are in a standing position. With these handles, it is possible to close the covers tightly, open them easily and do this without the danger of pinching fingers, and without the effort otherwise exerted.

Barrel to Hold Oil Bled From Line

IN bleeding air from the line of a gathering system, a pipe-line company found that the ground around the pump was unnecessarily contaminated with oil coming out with the air. To avoid this, a barrel was installed near the pump with a connection to the pump for blowing into the barrel which is used when it is necessary to bleed air. An opening at the top of the barrel provides for the escape of air from the line during this operation.

Marker for Tile

IN laying lines through northern states such as Illinois, Indiana and Ohio, contractors find that care must be given to the replacing of tile used for draining fields crossed by the line. In order to make sure just where repairs must be made to tile, some organizations make a practice of placing a flag at such points so that tile can be delivered there. This also enables the tile foreman to quickly identify these locations when he follows up lowering-in operations to make tile replacements before backfilling.



Rack for Holding Oil Cleaner

THE district garage foreman of a large pipe-line company has devised a rack which has proved to be useful for holding the oil cleaner in place on an electric welding machine, sand blaster or pumping motor. This rack is bolted to the engine on which it is installed and may be quickly removed when necessary.

QUESTIONS on TECHNOLOGY

by W. L. Nelson

This department was created for the purpose of aiding managers, superintendents, engineers, chemists and all those engaged in the various phases of plant operation; also those connected with the marketing and utilization of petroleum products. Readers are invited to submit their problems to W. L. Nelson, technical editor. Questions should be submitted in as much detail as possible. Inquiries must be signed, but only the given initials will be printed. The source of the question is considered to be confidential. Questions requiring a discussion of patents, extended computations, or a detailed study cannot be considered. When the matter is of general interest, a reply will be published within a reasonable time.

Simplified Flow Diagrams

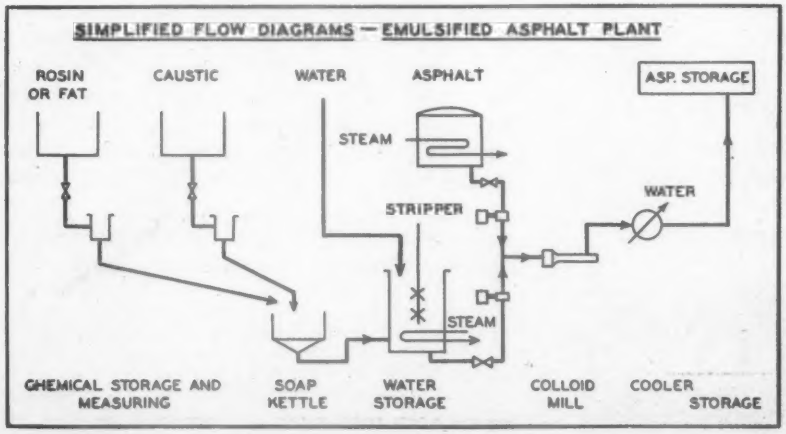
Emulsification of Asphalt

We are having trouble in making emulsified asphalt especially in finding chemicals that are priced right. Would like to know where to get information and data on emulsion(s) and emulsified asphalt. Also if the type of mixer plays an important part.—M. T.

Although the production of emulsified asphalt involves only one main operation (that of mechanically mixing water, asphalt and the emulsifying agent to a fine degree) this operation must be properly conducted particularly if several types of emulsified asphalts are to be produced. Thus, the heart of the asphalt plant is the colloid mill or mixer in which the three agents are contacted. Paddle type mixers have been used but a large variation in particle size results, and hence the type of mixer now most widely used is the colloid mill. This consists essentially of a rapidly moving face at close proximity to a fixed face. Many designs are employed; with a corrugated moving plate, with a smooth moving plate, or in the shape of a cone rather than a flat plate. Obviously the power requirement of such a machine is high; ranging from 0.02 to 0.05 hp.-hr. per gal. for large mills and as large as 0.1 hp. per gal. for a 100-gal. per hour mill. Colloid mills are discussed in chemical engineering handbooks, such as Perry's, McGraw-Hill Book Co., Inc., 330 West Forty-second Street, New York.

Two main types of emulsifying agents are employed, the sodium soap type and the clay or bentonite type. The emulsifying agent is dissolved or mixed into the water and the melted asphalt is mixed with the (heated) water in a colloid mill. About 50 per cent of water is employed and the emulsification agent usually constitutes 1 to 2 per cent of the mix. The cheapest types of soaps are employed, although numerous soaps, etc., are mentioned (see particularly Ellis). Almost any saponifiable vegetable or animal fat converted into its sodium soap may be used. A common soap is that made from rosin and caustic soda (30° B.). A complete description of the preparation of such a soap is given by J. W. Smith. The production of clay type emulsions is given by J. Miscall.

The flow diagram shown on this page indicates the auxiliary equipment that is needed in the manufacture of emulsified asphalt. In case clay (or ready-made soap) is employed, the chemical tanks and soap kettle are not needed. All asphalt lines should be steam jacketed.



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Effect of Metal Wall On Heat Transfer

I have been told by a college graduate that the kind of metal used in a heat exchanger has no effect on the amount of heating obtained. I also see a book called HEAT TRANSFER THROUGH METALLIC WALLS that says differently. What is the reason for this?—S. M. P.

The bulletin which you refer to is an excellent survey of the use of different metals for exchanger tubes and is published by the International Nickel Co. This bulletin is a complete and dependable discussion except perhaps in that it does not call attention to the situation at very low transfer rates. Charts are included for several common metals, such as

copper, aluminum, red brass, admiralty brass, mild steel, nickel, lead, cupro nickel, monel, stainless steel and inconel.

The thermal conductivities of these and other metals (and alloys) are shown in Table 1 on this page. The main purpose of this tabulation is to indicate the general order of conductivity, and to permit interpolation between the extreme of high-conductivity copper and low-conductivity inconel in connection with Table 2.

TABLE 1

Thermal Conductivities (32°-212° F.)

Material—	Conductivity B.t.u./hr./sq. ft./°F./in.
Copper	2,680
Aluminum	1,570
Red brass (85-15)	1,100
Yellow brass (65-35)	830
Zinc	770
Admiralty brass	760
Ingot iron	470
Mild steel (S.A.E. 1020)	460
Tin	455
Nickel	420
Lead	240
Nickel silver (18 per cent)	230
Silicon bronze	225
Cupro nickel (70-30)	200
Monel	180
Stainless steel (Type 430)	155
Stainless steel (Types 304, 316, 321)	105
Inconel	104

TABLE 2

Percentage Decreases and Percentages Increases in Surface Required When Using Copper or Inconel to Replace Steel. (For a metal thickness of 1/16 in.)

Approx. over-all transfer rate (incl. fouling) B.t.u./sq. ft./hr./°F.	Percentage change in surface required compared to steel	
	Copper	Inconel
1,200-3,100	—26	106
900-1,900	—17.9	73
600-1,000	—9.9	41
180- 200	—2.1	9
97	—1.3	4.4
33	—0.5	1.6
20	—0.3	0.9
10	—0.2	0.2
2	—0+	0+

The transfer of heat is a complicated phenomenon involving not only the conductivity of the metal wall but also the very complicated heat transfer coefficient. Thus, if the heat transfer rate is high the kind of metal employed will be important whereas if the heat transfer rate is low, the kind of metal has little effect. These relationships are indicated in Table 2. It will be noted that two values of the percentage decrease (or increase) in surface required is given for each over-all transfer rate: the low percentage figure refers to the use of copper in place of mild steel and the high percentage figure (over 100 per cent) refers to the use of inconel in place of mild steel. Other metals that have conductivities intermediate between these two extremes can be estimated by an inspection of Table 1.

Thus, at extremely high transfer rates (1,000-3,333) the use of copper in place of steel results in surface savings of 10 to 26 per cent—and conversely at very low transfer rates (10 and under) the kind of metal has no effect. Likewise, the use of inconel for high transfer rate exchangers requires much more surface than when using steel, even twice as much (106 per cent) at a transfer rate of 3,333. The percentage of surface required as compared with steel will be changed somwhat by the thickness of the tube or metal wall (⅛ in. in Table 2); increasing the thickness (over ⅛ in.) causes bigger differences (29.5 per cent and 162 per cent for first values in Table 2) and thinner metal causes smaller percentage differences. In commercially common thicknesses the effect of wall thickness on the values given in Table 2 are not important.

Construction in the Refining Industry

Have you any data showing the value of oil refinery construction for the period 1930 to 1942 inclusive? We wish to compare construction activity in the oil-refining industry with the trend of our own business over this 12-year period.—H. S. F.

Perhaps the most extensive and dependable information of this sort is the study made by Pogue and Conqueron in the February 19, 1943, issue of The Oil and Gas Journal (p. 33) entitled "Capital Flow and Formation in the Petroleum Industry—1934-41." The total yearly expenditures of the refining branch of the industry for **fixed asset accounts** are, according to estimates based on 30 large oil companies who produce 52.5 per cent of our crude oil and refine 79.9 per cent of it, as follows:

1934	$64,219,000
1935	52,866,000
1936	74,072,000
1937	112,344,000
1938	108,982,000
1939	117,209,000
1940	103,705,000
1941	113,578,000

These figures consist of maintenance equipment and supplies as well as new machinery or operating equipment, but the exact split cannot be easily stated. Mr. Ziegenhain, in The Oil and Gas Journal of March 30, 1939 (p. 48) indicates that about 40 per cent is for maintenance and supplies, with 60 per cent for heavy prefabricated equipment. In possible contrast, U. S. Bureau of Commerce figures indicate (see The Oil and Gas Journal, p. 57, Apr. 16, 1942) that not all of the 60 per cent is prefabricated equipment, consisting to some extent of the cost of constructing buildings and structures.

Safety Cylinder as an Explosion Preventer

(Continued from Page 84)

explosive proportions, it ignites in the safety cylinder, raises the temperature which expands the fluid in the sylphon valve and forces the sylphon valve plunger into the contact which shorts the magneto. This instantly cuts off the engine ignition and shuts down the plant. Changes to safe proportions of air and gas are then made before the plant is started up again.

It is possible to use the plunger of the sylphon valve to turn a ratcheted valve handle, automatically reducing the amount of air admitted into the mixture to a proportion below the explosive range. This same principle is used on the valve in the steam line which controls the temperature in incubators.

Protection Against Water Failure

It is usual in repressuring operations to protect the compressors and engines against failure of the supply of cooling water by a somewhat similar shorting device. Water is made to flow through the water jackets by gravity from an elevated tank into which it is raised by pump from a lower water supply. At times the pumps get out of order so that without some precaution the tank would run dry and the compressors and engines would run hot and destroy themselves. An automatic shorting device prevents this. The inflow to the tank passes into a pail with a perforated bottom. The pail is suspended by a rope over the pulleys and is counterbalanced to maintain its position when full, and the rope is connected with a shorting device which contacts whenever the pail is empty. If the pumps stop putting water into the pail, it empties through the perforations in the bottom, rises because of decreased weight, shorts the engine magneto and shuts down the plant. This is a good oil-field device because it is cheap, the pumper understands it—he probably made it in the first place and can repair it, and because of its simplicity, he has perfect faith in its ability to do its job. It is such devices that work best under the primitive conditions often found in many parts of the oil fields.

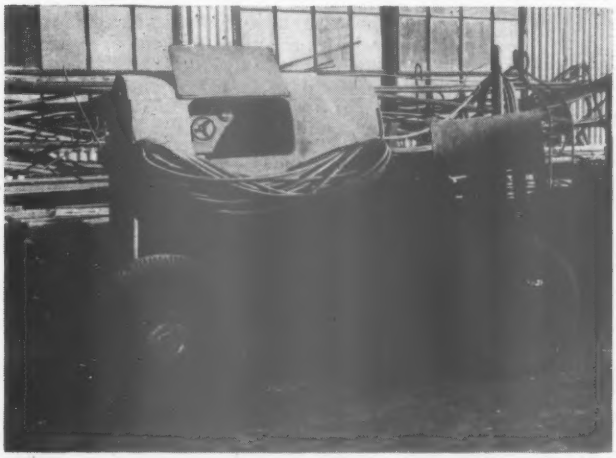
It is the hope of the writer that the safety cylinder may work out to be as simple and useful as the pumper's pail.

The author wishes to acknowledge with thanks the help and suggestions of the U. S. Bureau of Mines and of Dr. R. J. Piersol, Dr. A. H. Bell, Dr. F. H. Reed, Dr. J. S. Machin, and P. W. Henline of the survey staff.

PLANT PRACTICES

Small Window for Welding Unit Hood

ONE of the larger Kansas refineries has several portable electric welding units for use in various parts of the plant. In the side of the metal hood which covers the generator and controls of each outfit, a window has been cut adjacent the controls. The window has a hinged flap door for a covering This eliminates the necessity of lifting the entire hood when operating the welding unit, and affords better protection in bad weather. Only the small window flap need be raised.



Still for Recovering Glycerin

A SMALL still for the reclamation of glycerin (now hard to obtain) used in charcoal tests in refinery and gasoline plant laboratories has been devised by the operator of an Oklahoma plant. It consists of two main units, a bottom container for water and a top section for the used charcoal bearing the glycerin to be reclaimed. Both were made from a short section of old 8⅝-in. pipe. The bottom of the top unit is a perforated metal sheet. With a bunsen burner placed under the unit, the water in the bottom section is heated forming steam which permeates through the charcoal in the overhead container freeing the glycerin which drains down through the perforated separating bottom of the upper unit into the bottom container. The water chamber has side opening for insertion for a thermometer to determine when the water has been evaporated. The bottom has a drain cock for drawing off the glycerin.

Annealing Furnace For Refinery Shop Aids in Reclaiming Old Materials

ONE major Kansas refinery doing quite a bit of work in reclaiming old materials and rebuilding and repairing old equipment has equipped its welding, metallizing and forge shop with an annealing furnace, designed and built in the shop. Although of the simplest design it has proved extremely effective and efficient. The walls and top were constructed of several layers of fire brick. The front end is open. Heating is by means of four gas torches at the front end, one at each corner, top and bottom. Temperature control is effected by the number of burners in use at a time and by regulation of the individual burners.

VALUE OF NEARLY DEPLETED OIL-PRODUCING PROPERTIES

RECENT increases in operating costs without an accompanying increase in revenue has hastened the consideration of many nearly depleted properties for abandonment. The profit in such cases has entirely disappeared or has been so reduced that those operating the properties do not feel justified in expending the efforts required to get the oil production.

The matter of abandoning a lease cannot be decided entirely on its revenue under the present method of operation, and the same applies to the establishment of the value of a particular lease when its purchase is being considered. Methods of immediately putting the property on a paying basis plus its value as a deeper prospect must be considered.

The first item to be investigated is an increase in revenue through improved operation of a property which has been allowed to run down. In many instances, equipment has been allowed to deteriorate to the point where maintenance costs have become exorbitant. The first item to be decided is whether the present method of lifting and the present equipment should be repaired and retained or whether new equipment and a new method are needed. A brief review of the conditions in the pool will indicate whether a shift in the manner of lifting the oil will result in sufficient savings to permit continued operation of the property.

At the present time, many of the leases producing only a few barrels of oil per day are equipped with old standard pumping rigs which frequently require repair and which reduce the net revenue. Tests of the wells, an analysis of the income lost through down time and an estimate of the cost of the needed repairs or a new pumping unit along with the time required to pay out the added investment will show whether such a remedy is available.

Study of the pumping cycle to eliminate sucker-rod breaks may enable the marginal property to begin showing a profit. On the average approximately 30 per cent of the operating cost of a well is due to repair and sucker-rod breaks; this does not include lost production. In a great number of instances the cause of the rod breaks is simply the effort to get all the production possible from well and a slight reduction in the amount of oil produced may almost entirely eliminate the expense of pulling jobs.

Location of the pump and the pump submergence likewise affect the cost of lifting the oil and the profit from the lease. In some cases valuable production is being lost by running the pump too high and in other cases frequent pump-repair jobs are caused by running the pump too low. Some wells can be pumped to bottom and others must be operated with a fluid level which covers the sand face. Change of the type of pump used (which requires a very modest investment) may also make a substantial difference in operating expense.

Reconditioning of a well either by shooting or acidizing can be attempted on one or two wells and sound economic decision made on the value of this method for the remainder of the lease. In one case in North Texas recently, the use of a fairly modest amount of chemicals boosted the production of a lease several hundred per cent, quickly returned the investment and postponed indefinitely the abandonment of the property. Often a cleansing of the area immediately around the well bore is all that is needed to boost production substantially. Reducing the amount of water by any method may be helpful.

Gas-lift wells may be studied for a means of reducing the gas-oil ratios or an attempt may be made to reduce the compression charges or charge for gas. Other conditions affecting the lifting costs, such as the amount of water lifted and the corrosion which causes many tubing jobs, may be examined.

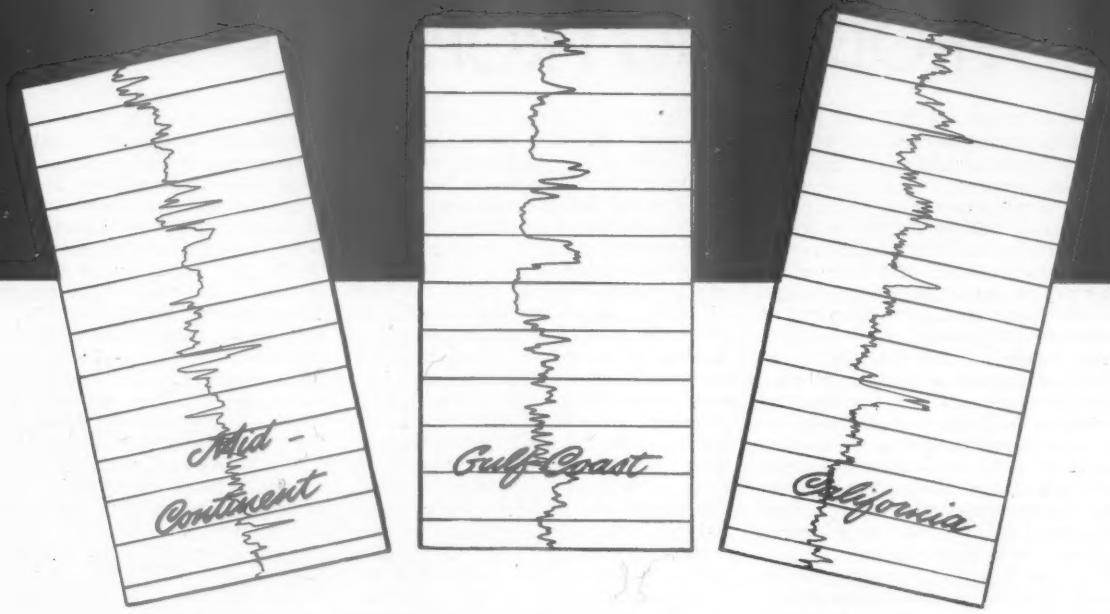
New Pay Zones

In quite a few instances it has been found that all of the pay streaks in the producing horizon in a particular field have not been penetrated. These were due to the encountering of a nonproductive horizon after striking the pay. History of other wells in the same field or in the same general area often provide a clue to the possibilities. In one field a lower pay zone was discovered when it was noticed that some of the wells sustained their production while others fell off. It was reasoned that these wells were connected by some means to a pay zone not yet tapped. Deepening a few of the wells slightly proved this to be true. The cost of the deepening, the increased reserves to be obtained and the increase in the daily production of the property should be carefully estimated.

Presence of upper pay zones in old wells is often indicated by other similar attempts for production there in the same general area, the study of the logs of the wells in the immediate vicinity and wise use of radioactive logging. Opening of the casing and the testing of a few wells can be accomplished without the expenditure of too great amount of money after which the production increase and the reserves to be obtained may be evaluated.

One of the most indicative facts is the amount of oil remaining in place in the pay zone, i.e., the unrecovered reserves. The accumulated recovery deducted from the original reserve estimates, or reserve estimates based on the original data, are helpful. Better yet is the balancing of the recovery from a particular lease against the recovery of the surrounding leases taking into account the position on the structure and the type of field involved. If a lease has produced only 50 per cent of the oil produced by similar amounts of acreage and number of wells surrounding it, is reasonable to believe there is further production to be obtained. A test well drilled between existing wells to determine the present saturation may lead to further recovery.

If the property has never been repressured with gas or there has been no attempt to water flood it, the possibilities from this angle should be evaluated. An investment of from $2,000 to $10,000 in shallow areas may step up the daily production several hundred per cent and may result in doubling the total recovery from the lease. History of similar projects, conditions in the sand, and expense balanced against reserves and new production must be considered.



Aids in the Development of Effective, Accurate, Remedial Programs

Remedial programs, to sustain production of existing wells and enable operators to meet today's demand with a reasonable measure of efficiency, require complete information about formation back of casing. For many wells drilled prior to electrical open hole logging no accurate records exist.

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UPPER PAY ZONES MAY BE ECONOMICALLY DEVELOPED

THE importance of finding new oil reserves has been stressed repeatedly by leaders in the petroleum industry as well as by those charged by the Government with seeing the armed forces and the civilian economy do not suffer due to a lack of liquid fuel. The attention has been mainly centered on finding new structures and new fields by the drilling of exploratory wells with little thought being attached to the exploitation of upper horizons in fields already producing.

Just what quantity of oil may be available through development of upper horizons is practically anyone's guess. In recent years, most wells were drilled under more or less close supervision and many of the upper horizons developed along with the lower pays. Illinois, for instance has a large number of multizone completions.

In the older areas the picture is somewhat different due to the fact that the wells may be 15 or 20 years old, or even older. This means that they were drilled at a time when the geologist's control was not as close as it is at present and considerable dependence must be placed on the drillers' logs. Many companies and their geologists and engineers are skeptical concerning the value of such logs. Actually these logs, used carefully and intelligently, can be employed with the new radioactive methods of logging to locate accurately producing horizons already cased off in old holes. The perforating or ripping of the casing at points opposite these potential producing zones is then a simple matter.

Accuracy of Logs

There has been little question on the value of logs from cable-tool-drilled wells but the accuracy of the rotary-drilled well logs has been questioned. Investigation by one engineer with a large independent company showed these logs were exceptionally accurate. One of the considerations overlooked is the fact these older wells were drilled with fish-tail bits which are unusually responsive to formation changes and which produced cuttings that could be clearly interpreted.

Examination of the drillers' logs from the wells in a particular field will often show some marked discrepancies but the cause can generally be determined. Frequently such errors are due to incorrect drill-pipe measurements which are later corrected and consequently the lower formations show no sudden breaks while the upper ones do. After examination of the drillers' logs in a pool has shown several blanket sands to exist, it remains to locate these zones exactly. Ripping the pipe or perforating it on the basis of information obtained from the drillers' logs only is practically valueless but after running radioactive logs the potential producing zones can be located accurately.

From 700 ft. to about 1,200 ft. the radioactive logs obtained through the casing will show the formations to be running about 5 ft. lower than on the drillers' logs; the difference diminishes throughout the interval. At 1,200 ft. the radioactive log and the drillers' logs practically coincide but at 1,400 ft. the radioactive log will begin to run higher and at 2,200 ft. will be about 10 ft. above the drillers' log. Primarily, this discrepancy is due to sample lag although some of it is due to conditions of measurement.

An example of the accuracy obtained by correlating the drillers' logs and radioactive logs is afforded by a recent well. A gas zone was located at 1,820 ft. and the pipe was ripped at that point, the opening in the pipe being 1 ft. A considerable flow of gas developed. The pipe was then ripped 3 ft. higher and no increase in gas was obtained showing that if the original opening had been improperly located, the gas zone would have been missed.

This same well, which had been producing at 2,300 ft. but which had declined to where it was no longer profitable, showed a possible producing zone at 2,150 ft., 1,848 ft., 1,820 ft. and 1,750 ft. to 1,800 ft. The 2,150-ft. zone contained water, the 1,848-ft. zone showed even more water and the 1,820-ft. zone showed gas while the 1,750-1,800-ft. zone was completed for a 10-bbl.-per-day well with reserves estimated at from 10,000 to 15,000 bbl.

This is certainly not a large quantity of oil but when the investment required to obtain it is considered, the picture changes considerably. The radioactive logs cost $325 and the company used its own spudding machine at a total cost for its work of $372, or a total expenditure for the job of $697. Reduced to barrels per day of production this amounts to an investment of $69.70 which was returned in approximately 4 months. On the basis of reserves developed the investment amounts to $0.055 per barrel which compares with a 1,000,000-bbl. reserve found at a cost of $60,000. To get such a reserve on a 40-acre location would mean the production of 25,000 bbl. to the acre, a recovery not realized in but few instances.

Hazards

There are two hazards in attempting such work, the first being the possibility that the upper formations contain no oil and the second being the excessive costs of opening the upper horizons. The services of the company making the radioactive logs are definite. Unless an extremely good well is anticipated, the casing cannot be milled out or whipstocked as the investment in rig time is too great. Gun perforating, casing-ripping costs can be closely estimated and consequently the operator knows ahead of time the approximate investment required.

Another danger is the possible attempt to eliminate the radioactive log through which the exact location of the formations to be tested is obtained. If a program of searching by perforating and testing and then squeezing off barren or water-bearing zones is followed, the costs become excessive. If the work is to be done profitably, the casing openings opposite a formation must be correctly located on the first try after which a simple plug can be run above that zone and the next higher possibility tested.

Successes in this type work, both from the amount of oil obtained and the repayment of the investment required, have been numerous enough to warrant its consideration for application to any average-size lease before it is considered for abandonment.

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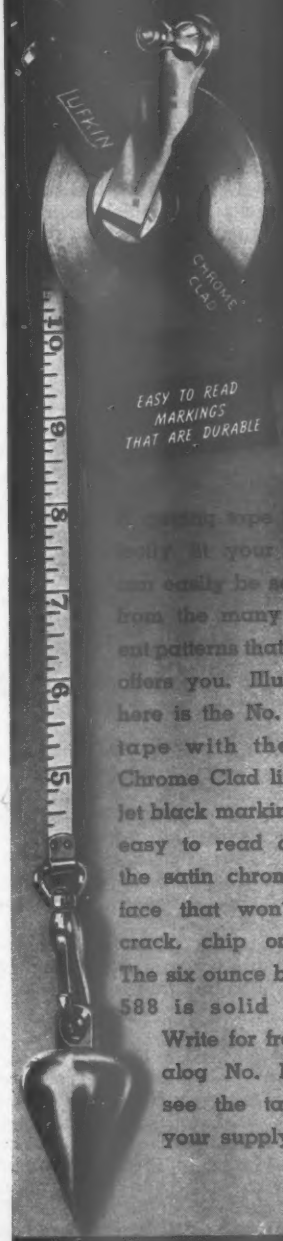

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A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

VARIABLE COMPRESSOR CLEARANCE

FROM an operating standpoint, it is desirable in certain instances to provide a means for changing the clearance of a given compressor in order to more nearly fit it to conditions that may have changed since the compressor was installed. Or such a change may be required in order to adapt a compressor, or compressor cylinder, already on hand to a given set of conditions. Such practice will often eliminate the necessity of buying a new compressor or, at least, new cylinders and pistons. New cylinders and pistons cost a lot of money, but provisions can be made for variable clearance at a nominal cost and a considerable saving realized.

Some of the practical situations that may arise include:

1. A compressor installation may be made to fit a certain pressure ratio. At some later time in the life of the installation the intake pressure may of necessity be lower, or the discharge pressure may be higher than during the early life of the equipment.

2. A compressor installation may be made where there is a possibility that the demand for the discharge gas will vary over wide limits.

3. For a certain application, calculations may show that a certain size of cylinder is required with customary clearance to handle gas at a certain desired rate. Examination of cylinders on hand may reveal that none of them are the proper size for the job. It should be realized that a cylinder which is too large with its designed clearance may have its capacity reduced by adding clearance and the purchase of a new cylinder avoided.

It is evident from discussion in previous installments that a reduction in volumetric efficiency due to larger clearance not only reduces the power required to drive a compressor at a given speed but also reduces the amount of gas compressed. If the situation being considered would not allow a reduction in amount of gas compressed, increased clearance would not be advisable. On the other hand, a sacrific in volume of gas could sometimes be permitted in order to reduce power requirements.

Most compressor cylinders, if not already provided with clearance pockets, have an opening into the end of the cylinder which is ordinarily closed by a plug. This plug may be removed and replaced by a suitably capped pipe nipple of such volume as to give the desired clearance. If the cylinder has no such plug it may be drilled and tapped for connection of the clearance pocket. By placing a valve between the clearance pocket and the cylinder, the clearance may be easily controlled merely by opening or closing the valve. None, one, or more pockets may be open to get various degrees of change in the power requirement and volume of gas compressed.

Example

Problem: It is planned to install a two-cylinder compressor with 180-hp. available at the compressor cylinders. Gas is to be taken in at 55 lb. per sq. in. abs. and discharged at 220 lb. per sq. in. abs. The compressor is to operate with a 20-in. stroke at 200 r.p.m. Piston rods are 2 in. in diameter.

1. What must be the diameter of the cylinders used in order to utilize all the available horsepower, if new cylinders are to be purchased with 5 per cent clearance?

2. Some 9¾-in. by 20-in. cylinders with 5 per cent clearance are already on hand. What must be the clearance volume in cubic inches added to each end of this size of cylinder to adapt them to this application?

Solution:

First, a value for the exponent of compression "n" should be assumed. A good average value is 1.2.

The pressure ratio, R = 220/55 = 4.0.

From Table 1 of Installment 76, when n = 1.2 and R = 4.0,

$$[R^{(n-1)/n}-1] = 0.26$$

Using equation (3) of Installment 76, calculate the volume of gas that can be compressed with the available power, as follows:

$$180 = 0.0642\ V_s \frac{1.2}{1.2-1}(0.26)$$

Solving, V_s = 1,798 std. cu. ft. per minute.

Correcting from standard pressure to intake pressure,

$$V_1 = 1{,}798 \times \frac{14.7}{55} = 480.6 \text{ cu. ft. per minute}$$

Then the volume handled per cycle by one cylinder is,

$$D_v = \frac{480.6}{2 \times 200} = 1.201 \text{ cu. ft.}$$

Now the volumetric efficiency may be figured as follows: (See Installment 77)

$$E_v = 0.98 - 0.05\,[4^{1/1.2} - 1]$$

From Table 1 of Installment 77,

$$[4^{1/1.2} - 1] = 2.175$$

Then,

$$E_v = 0.98 - 0.05\,(2.175) = 0.871$$

Then the nominal displacement of each cylinder is

$$D_n = \frac{1.201}{0.871} = 1.379 \text{ cu. ft.}$$

Volume of piston rod = 0.036 cu. ft. (Table 2, Installment 78)

Then, using equation (1) of Installment 78 the diameter of the cylinder may be determined as follows,

$$1.379 = (0.000454 \times 20 \times d^2)\ 2 - 0.036$$

$$d^2 = \frac{1.379 + 0.036}{0.000454 \times 20 \times 2} = 77.92$$

$$d = 8.83 \text{ in.}$$

Then if new cylinders with 5 per cent clearance are to be purchased they should be the next available size below 8.83 in., possibly 8¾ in.

In using a 9¾-in. cylinder it must have enough clearance added that its volumetric displacement will be the same as the value calculated above; that is, 1.201 cu. ft.

Using Tables 1 and 2 of Installment 78 for a 9¾ in. by 20-in. cylinder and 2-in. piston rod,

$$D_n = 1.726 - 0.036 = 1.69 \text{ cu. ft.}$$

Then the volumetric efficiency must be

$$E_v = \frac{D_v}{D_n} = \frac{1.201}{1.69} = 0.7106$$

Substituting in equation (2) of Installment 77,

$$0.7106 = 0.98 - c(2.175)$$

Solving, $c = \frac{0.98 - 0.7106}{2.175} = 0.1239$

Then the final clearance on each 9¾-in. cylinder must be 12.39 per cent, or the added clearance must be 12.39 − 5.00, or 7.39 per cent.

The head end displacement of a 9¾-in. cylinder is (using Table 1, Installment 78):

$$1.726/2 = 0.863 \text{ cu. ft.}$$

The crank end displacement is

$$0.863 - 0.036 = 0.827 \text{ cu. ft.}$$

Then the volume of clearance pocket used on the head end of each 9¾-in. cylinder is 0.863 × 1,728 × 0.0739, or 110.2 cu. in.

And the volume of the clearance pocket for each crank end is 0.827 × 1,728 × 0.0739, or 105.6 cu. in.

Engineering Fundamentals No. 80

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

THE EXPONENT OF COMPRESSION

THE accuracy attained in the calculation of compression horsepower, volumetric efficiency and temperature rise depends largely upon the evaluation of the exponent of compression. In most considerations, an arbitrarily assumed value of this exponent is sufficiently accurate, but in calculations where a fine degree of accuracy is desired the use of an assumed value for n may result in appreciable error.

There are several interrelated factors which affect the value of the exponent, including: degree of cooling, composition of the gas and deviation from the perfect gas laws. Many engineers when making ordinary horsepower or volumetric efficiency calculations assume a value of n of 1.2. Experience has shown that use of this value is fairly close to the actual conditions in the average gas compressor. Gill* states that reasonably accurate results can be obtained by using the following formula,

$$n = 0.75\,(k - 1) + 1 \qquad (1)$$

where

n = exponent of compression
k = ratio of specific heat (C_p/C_v) for the gas being compressed

At best, equation (1) is only empirical and will give no better than an approximation. For a more accurate determination of n value, Gill recommends the use of an indicator diagram. The method can best be described by following through the analysis of an actual diagram.

Example

Problem: The indicator diagram abcd (including atmospheric line xx') as shown in Fig. 1 was taken from the head end of a gas compressor. Other known data are:

Scale of indicator spring, lb. per sq. in. per in.	40
Atmospheric pressure, lb. per sq. in.	14.5
Clearance ratio of head end, per cent	6.12
Head end displacement, cu. in.	607

Determine the values of the exponent n indicated for both the compression line and the reexpansion line.

Solution:

First, draw in the line of zero absolute pressure. This is most easily done by using an engineers' scale and measuring down vertically from the atmospheric line a distance that will equal the atmospheric pressure. In this problem, since a 40-lb. spring was used on the indicator, the "40" scale on the engineers' scale should be used. Since the atmospheric pressure is 14.5, then the zero pressure line is located 14.5 divisions of the "40" scale below the atmospheric line. Regardless of the kind of scale used, the zero pressure line should lie 14.5/40, or 0.362 in. below the atmospheric line for this particular card.

The next step should be to locate the line of zero volume. This can be done by measuring to the left from the left end of the card a distance equal to the product of the clearance ratio and the length of the card. For the card given, the length is 3.94 in. and the clearance ratio of the compressor is 0.0612. Then, in order to locate the zero volume line we must measure to the left from point x a distance of 0.0612 × 3.94, or 0.241 in.

Next, equally spaced horizontal pressure lines should be drawn above the zero pressure line. In this problem a convenient spacing is 0.25 in., since the distance will represent 10 lb. per sq. in.

Then the equally spaced vertical volume lines may be drawn. A convenient volume increment to place the lines reasonably close together can be chosen. For this example, this spacing was chosen so that each space represents 25 cu. in. Since 3.94 in. on the card represents a displacement volume of 607 cu. in., 25 cu. in. would be represented by a horizontal distance of

$$\frac{3.95 \times 25}{607} \text{ or } 0.162 \text{ in.}$$

Thus the vertical lines are spaced 0.162 in. apart. Extreme care should be taken that the pressure lines are parallel to the atmospheric line and that the volume lines are perpendicular to the atmospheric line.

Points are now chosen along the compression and reexpansion lines as 1 to 11 inclusive, shown in Fig. 1.

These points are now plotted on log-log paper as in Fig. 2. The points on log-log paper should fall on a straight line, but often certain irregularities, such as valve leakage, may cause either one or both of the lines to deviate from a straight line.

The value of the exponent n will be equal to the slope of the straight line plotting. This slope may be determined by drawing the line x parallel to the volume axis through any point near the extremity of the straight line plotting, drawing the line y parallel to the pressure axis through any point near the other end of the straight line plotting, measuring the length of each, and calculating the ratio y/x.

In Fig. 2, y = 2.03 in. and x = 1.98 in. Then, for the reexpansion line, n = 2.03/1.98 = 1.025.

In Fig. 2, y' = 2.13 in. and x' = 1.78 in. Then, for the compression line, n = 2.13/1.78 = 1.20.

*Gill, T. T., "Air and Gas Compression," John Wiley & Son, 1941.

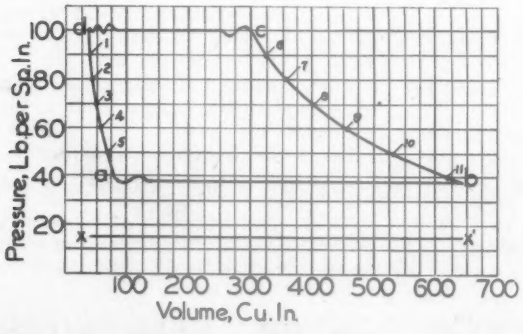


Fig. 1

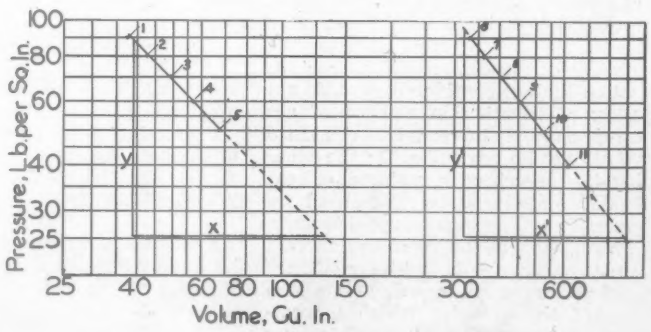
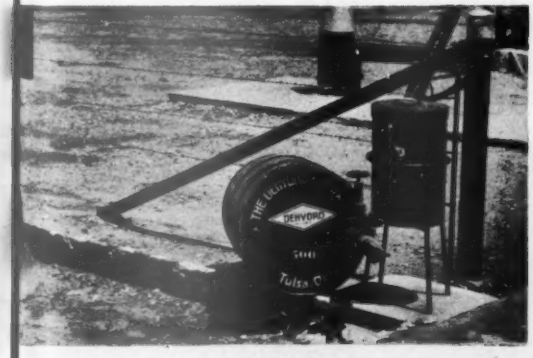


Fig. 2

PROOF

of Performance



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REFINING

Standard of California to Expand Plane-Fuel Output

SAN FRANCISCO, Calif.—Plans for large increases in the production of high-octane aviation gasoline this year by Standard Oil Co. of California were revealed here last week by H. D. Collier, president, in his report to stockholders. Increased deliveries of petroleum products to governmental agencies by the company in 1942 more than offset the effects of decreased civilian use of automobiles, Mr. Collier disclosed.

The substantial position that petroleum has already attained and is expected to expand after the war as the source for hundreds of chemicals was referred to in the Standard of California report.

"The hydrocarbons which constitute petroleum," Mr. Collier told stockholders, "are a chemical storehouse of vast potentialities, some of which are only now revealing themselves to our view, with other probably yet to be discovered."

Standard of California spent about $42,000,000 in 1942 on additions to plant and equipment, Mr. Collier reported.

Plant for Manufacturing Catalyst Finished in Texas

FORT WORTH, Tex. — A new $2,500,000 plant for the manufacture of catalyst used in catalytic refinery operations was placed in service here last week by American Cyanamid & Chemical Corp. Construction work was done by Chemical Construction Co., and the project was financed by the Defense Plant Corp., an agency of RFC.

Similar plants are under construction at Corpus Christi, O'Donnell and Brownfield, Tex., which, along with the Fort Worth operation, are under the direction of W. L. Spalding, man-

• *Operating 24 hours per day, 365 days per year, these Buda engines (one JL-1335, two JL-877's) drive centrifugal pumps at a Southern Texas gasoline plant.*

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These representatives of Tide Water Associated Oil Co., associated division, were honored last week when the company's Avon, Calif., refinery was awarded the Treasury Department's Minute Man "T" Flag. In the picture are: William P. Hugo, manager of manufacturing; Lt. Col. Arthur P. McGee, L. F. Bayer, vice president in charge of manufacturing; E. H. Smith, oldest Avon refinery employe; T. O. Edwards, Jr., superintendent of the Avon refinery; William F. Reagan, deputy administrator of the northern California war savings staff; Lt. Comdr. C. C. Carmine, U. S. Navy, formerly field engineer, Avon refinery.

ager for American Cyanamid & Chemical Corp.

Sketches of Plant Operators

A F. SPIEHLER, of the Pure Oil Co. refinery-control board, joined the company early in 1928 as a development engineer. He has served the company as a chemical engineer in the refining department since then.

Mr. Spiehler was born in Rochester, N. Y., and he attended grade school, high school and the University of Rochester there. Following 2 years at the University of Rochester, he attended the Massachusetts Institute of Technology and was graduated in 1920 with a degree in chemical engineering. He accepted a post at M. I. T. as an instructor in chemical engineering for the year following his graduation. Then he joined the Lewis Recovery Corp. of Boston, consulting engineers, for 2 years. Moving south along the Atlantic Coast, his next stop was at Philadelphia. He joined Atlantic Refining Co. and remained there 5 years doing general process chemical engineering and development work.

In mid-February 1928, Mr. Spiehler joined Pure with his first assignment at Cabin Creek, W. Va. He worked on the Gyro units 6 months. He then went to Toledo for 3 months, then to an experimental job at Marcus Hook, Pa. In 1930 he came to the Chicago office where he worked in the process division of the refinery-control board. For the past 5 years he has been a member of the board.

While in Philadelphia, or rather Marcus Hook with Pure, he met Miss Myrtle Kennedy of Nova Scotia. They were married in 1933. They live in Evanston where Richard, their 8-year-old son, keeps them busy.

Cities Service Finishing Aviation-Gasoline Units

A sulfuric acid alkylation plant and butane-isomerization facilities for the production of 100-octane gasoline will go into service early this month at the East Chicago refinery of Cities Service Oil Co. (Delaware). This is one of the manufacturing highlights revealed in the annual statement of the Cities Service Co. released last week.

Cities Service Refining Corp., another subsidiary, is constructing a refinery to process 70,000 bbl. of crude daily for the production of maximum quantities of aviation gasoline. The processes being installed include fluid-type catalytic-cracking units, sulfuric acid alkylation units and butane isomerization facilities. The new refinery will also produce large quantities of essential petroleum products, including the feed stock for one of the largest government-owned butadiene plants. The butadiene plant, which is being erected immediately adjacent to the Lake Charles, La., refinery as part of the national synthetic-rubber program will be operated by Cities Service Refining Corp.

Arkansas Fuel Oil Co., another manufacturing subsidiary of Cities Service, is converting part of its refining equipment to be used in the purification of crude butadiene for the Government.

TO ALL

NATURAL GASOLINE MEN

GREETINGS

FROM THE

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TWENTY-SECOND ANNUAL CONVENTION

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April 14-16, Baker Hotel, Dallas, Texas

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Natural Gas

California Natural-Gas Prices Remain Frozen

LOS ANGELES, Calif.—As had been expected with markets frozen, there will be no increase in prices paid for natural gas in California fields. The Kettleman Hills gas price long has been based on the fuel-oil quotations at El Segundo. Although El Segundo fuel-oil prices were raised 25 cents per barrel effective April 1 there will be no change in existing prices paid for Kettleman gas. The OPA ruling on gas prices did not come as a surprise as it had been expected that markets would remain frozen at the previous ceiling.

Mokan Acquires Control Of Panhandle Eastern

NEW YORK.—Control of the Panhandle Eastern Pipe Line Co., which operates one of the major natural-gas transmission lines from the Panhandle to the Detroit-Toledo industrial area, last week passed into hands of the Missouri-Kansas Pipe Line Co., culminating a long series of negotiations between Mokan and Columbia Oil & Gasoline Co.

Phillips Petroleum Co., Bartlesville, Okla., received 404,326 shares or 50.1 per cent of Panhandle Eastern stock from Columbia Oil & Gasoline Co., for a consideration of $10,435,654. Simultaneously, the Phillips company sold half of the stock to Missouri-Kansas, bringing the latter company's holdings in Panhandle to 68 per cent of the outstanding securities.

The change in control will bring about alterations in the Panhandle management. William G. Maguire, president of Missouri-Kansas, will become chairman of the Panhandle Eastern board and chief executive officer. J. D. Creveling, Panhandle president, is expected to resign and his post will be assumed by Edward Buddrus, Phillips executive.

East Ohio Will Expand Gas-Storage Operations

COLUMBUS, Ohio—East Ohio Gas Co. has received approval of the Ohio Public Utilities Commission to purchase natural-gas production properties and equipment of several concerns to further its storage program in Stark County. Expenditures for the properties will total approximately $171,500.

The proposed purchases by East Ohio include Timken Roller Bearing Co.'s gas production and gathering system for $95,000, wells and equipment of William F. and Carrie O. Pfeiffer for $50,000; interests of H. E. Perkins for $2,200 and a development project of George W. Crouse et al for $24,000.

FPC Postpones Hearing on East Ohio Gas Co.

WASHINGTON, D. C.—The Federal Power Commission announced last week its postponement until further order of the hearing previously scheduled to begin April 7, 1943, in Cleveland, Ohio, pursuant to its inquiry instituted in February 1939 for the purpose of determining whether East Ohio Gas Co., with principal offices in Cleveland, is a natural-gas company within the meaning of the Natural Gas Act and investigating the cost of natural-gas service rendered by the company, including the cost of transportation of natural gas from the Ohio River to the city gates of Cleveland, Euclid and Lakewood, Ohio.

Subsequent to the institution of the commission's investigation, these three cities filed separate complaints with the commission in June 1942 asking that the commission order East Ohio to show cause why it should not ascertain and submit the original cost of its properties in compliance with various orders of the commission addressed generally to all natural-gas companies subject to the commission's jurisdiction and stating that they have a substantial interest in the enforcement of the commission's orders and the determination of the company's original cost.

Southern Counties Gas Co. Expands Santa Maria Runs

LOS ANGELES, Calif.—Construction is now under way on facilities in Santa Barbara County, California, which will permit runs of an additional 8,000,000 cu. ft. of gas daily from the Santa Maria field, F. A. Hough, executive engineer of Southern Counties Gas Co., announced the project last week and said that it is a joint undertaking by Union Oil Co., Pacific Lighting Corp. and Southern Counties Gas Co. The project has been approved by the War Production Board.

Construction of the necessary facilities by Union Oil Co. and Southern Counties Gas Co. will make it possible for the latter company to take a total of 15,000,000 cu. ft. daily from the Santa Maria field.

Contract has been awarded for construction of approximately 5½ miles of 8 and 10-in. gas line to handle the higher runs. C. F. Briscoe, construction engineer for Southern Counties, soon will ask bids for construction of a dehydration plant designed by N. K. Senatoroff, another Southern Counties engineer.

Union Oil Co. is now constructing a natural-gasoline plant at a cost of approximately $500,000 in which much of the Santa Maria's increased output will be stripped of certain hydrocarbon fractions before it is turned into consumer-distribution facilities.

Natural Gasoline

Neutral-Oil and Wax Unit Added at Hamman Plant

BAY CITY, Tex.—A plant for the extraction of neutral oil and wax is being installed at Hamman Oil & Refining Co.'s natural-gasoline plant here. Hamman's basic facilities consist of an absorption plant with capacity of 12,600 gal. of natural gasoline daily and of 3,000 gal. per day of liquefied petroleum gas.

Program Completed for Natural Gasoline Meeting

Arrangements were being completed this week for the annual meeting of the Natural Gasoline Association of America which will be held April 14 to 16 at the Baker Hotel, Dallas, Tex.

A feature of the meeting will be an off-the-record "information please" session presided over by D. E. Buchanan, PAW director of District 3, Houston, assisted by C. R. Williams, the Chicago Corp., Corpus Christi, Tex.; J. W. Vaiden, Skelly Oil Co., Tulsa, and H. A. Ells, Cities Service Oil Co., Bartlesville, Okla.

The Natural Gasoline Supply Men's Association will hold its annual membership meeting at 5 p.m., April 14, and will be host to the N.G.A.A. Thursday evening. Technical papers and committee reports will run continuously from noon April 14 through Thursday afternoon.

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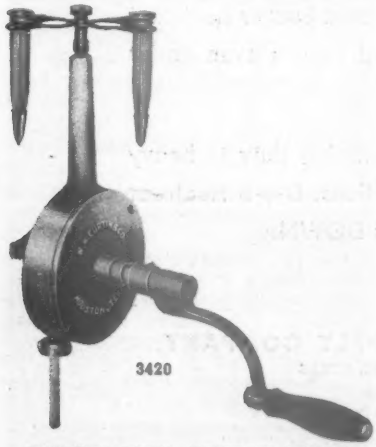

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PIPE LINES

WEP Completes All Stations, Longview to Norris City

All of the stations between Longview, Tex., and Norris City, Ill., on the 24-in. crude-oil line of War Emergency Pipelines, Inc., have been completed. However, only half of these are in operation because of the slowness in furnishing tank cars to the Norris City terminal. An article on the tank-car shortage at Norris City appears elsewhere in this issue.

As much as 4 to 5 miles per day is being laid in the construction of the eastward extension now that better weather has come. By the middle of last week 195.13 miles of 24-in. had been laid and 30.63 miles of 20-in., making a total of 225.75 miles. At the end of this week it is possible that a total of 270 miles may be laid.

Pan American Pipe Line Co. started shipment of a trial batch of No. 2 heating oil from Texas City, Tex., to tanks at the WEP Longview terminal, at the end of last week, preparatory to regular movement of distillate fuels through the WEP 24-in. line in May. Some changes are being undertaken in regard to line facilities at pump stations in order to eliminate causes of contaminations when the line will be shipping crude and heating oil in batches.

Contracts for WEP 20-In. Products Line Approved

Letters of intent have been sent to contractors for the laying of the western leg of the War Emergency Pipelines, Inc., 20-in. products line from Gulf Coast refineries to Seymour, Ind. An article on authorization for extending to the East Coast, appears elsewhere in this issue. Some equipment has been moved to the project already. Pipe is being shipped. Survey parties are staking the route. Assignment of contracts is as follows:

Section A — Williams Brothers Corp., feeder lines, Houston-Baytown, Tex., area, 28 miles of 8⅝-in.; 31 miles, 10¾-in.; total, 59 miles.

PIPE-LINE PERSONALITIES

M E. FANNON, of Tulsa, executive assistant to the general manager of Sinclair Refining Co., pipe-line department, for the past 11 years, has been made a vice president of the company and will soon move to Independence, Kans., where the department maintains headquarters. Announcement of Mr. Fannon's promotion was made last week by J. R. Manion, vice president and general manager of Sinclair Refining Co.'s pipe-line operations.

Mr. Fannon started his career in the transportation of crude oil with the old Prairie Pipe Line Co. at Independence, March 20, 1917. His 26 years of Sinclair and Prairie service has been spent in the executive department. His appointment as a vice president, after serving for 11 years as Mr. Manion's executive assistant, is a reward for long and efficient service.

R. C. Bearden, who also has more than 25 years of service with Sinclair and Prairie interests, has been appointed assistant to the executive in charge of the Tulsa office and will assume the duties formerly assigned to Mr. Fannon.

Mr. and Mrs. Fannon have lived in Tulsa for the last 23 years. They have one daughter, Mrs. R. H. Neckerud, and two grandchildren, Eddie and Patsy.

M. E. FANNON

Section B—Sharman & Allen, feeder lines, Baytown-Beaumont, Tex., area, 62 miles of 16-in.; Port Arthur-Port Neches, Tex., area, 8 miles of 18 3/10-in., 12 miles of 16-in., 13½ miles of 12-in., total 43½ miles.

Section C—N. A. Saigh Co., Beaumont, Tex., to point near Wiergate, Tex., 71 miles of 20-in.

Section D—Winston, Guthrie & Brown, Wiergate, Tex., to Red River, 71 miles of 20-in.

Section E—Williams Brothers Corp., Red River to White River, Arkansas, 270 miles of 20-in.

Section F—B & M Construction Co., White River, Arkansas, to St. Francis River., Missouri, 101 miles of 20-in.

Section G—Oil States Construction Co., St. Francis River to Mississippi River, 62 miles of 20-in.

Section H—Swinnerton & Walberg, Mississippi River to Norris City, Ill., 82 miles of 20-in.

Section I—Midwestern Engineering & Construction Co., Norris City, Ill., to Patoka River, Illinois, 64 miles of 20-in.

Section J—J. C. Truman Construction Co., Patoka River, Illinois, to Seymour, Ind., 78 miles of 20-in.

Contract Let by East Ohio For 120-Mile Gas Line

East Ohio Gas Co. has awarded a contract for laying 120 miles of 20-in. from Maumee, Ohio, to connect the Panhandle Eastern Pipe Line Co. system with the company's lines at Brecksville, about 14 miles south of Cleveland. Deliveries of pipe for the project, furnished by Youngstown Sheet & Tube Co., will be arriving so that laying operations will be under way about April 15. The line will be built with Dresser bolted couplings with the exception of road and river crossings which will be welded.

Construction of the line is being handled as a joint venture of Holland Construction Co. and Ford, Bacon & Davis Construction Corp. Field headquarters will be established at Norwalk, Ohio, this week in charge of H. T. Holland. There will be two main-line spreads and two river-crossing gangs.

Federal authorities are cooperating to facilitate the undertaking in order that additional supplies of natural gas will be available for war industries in the Cleveland, Ohio, area.

Atlantic Has Permit to Extend West Texas System

Atlantic Pipe Line Co. has received permission of PAW to extend its system from Grand Falls, southern Ward County, to the Abell pool in Pecos County, Texas. Nine miles of 6-in. and 8 miles of 4-in. salvaged pipe will be used. The extension will terminate at the Magnolia Petroleum Co. tank farm and gathering station in the Abell pool and will run crude purchased by Magnolia Pipe Line Co. for consignment to the firm at Wink, Tex.

Consolidated Suspends Plans for Steubenville Line

Consolidated Oil Corp. has temporarily abandoned plans for an oil pipe-line connection from Steubenville through Columbus, Ohio, to the big War Emergency pipe line that links Texas fields with the Middle West, it was learned last week.

Company officials said the project had to be shelved because of inability to obtain priorities for necessary construction materials.

No formal disclosure that such a plan even was being considered had been made until recently.

Products Moving Through Plantation Line Extension

WASHINGTON, D. C.—The head end of an additional 30,000-bbl. stream of gasoline, kerosene and light fuel oil for the East is moving this week through the newly completed 179-mile extension of the Plantation pipe line between Greensboro, N. C., and Richmond, Va.

"The front of the line-fill column of approximately 60,000 bbl. of gasoline will reach Richmond about April 12," Administrator Ickes said. "Barge and tank-car shipments to more northerly consumption centers will commence at that time.

"Initial deliveries at Richmond will run about 15,000 bbl. a day. Pump stations are nearing completion at Roxboro, N. C., and at Clarksville and Blackstone, Va. When these go into service, pipe-line deliveries will advance to full capacity of 30,000 bbl. a day."

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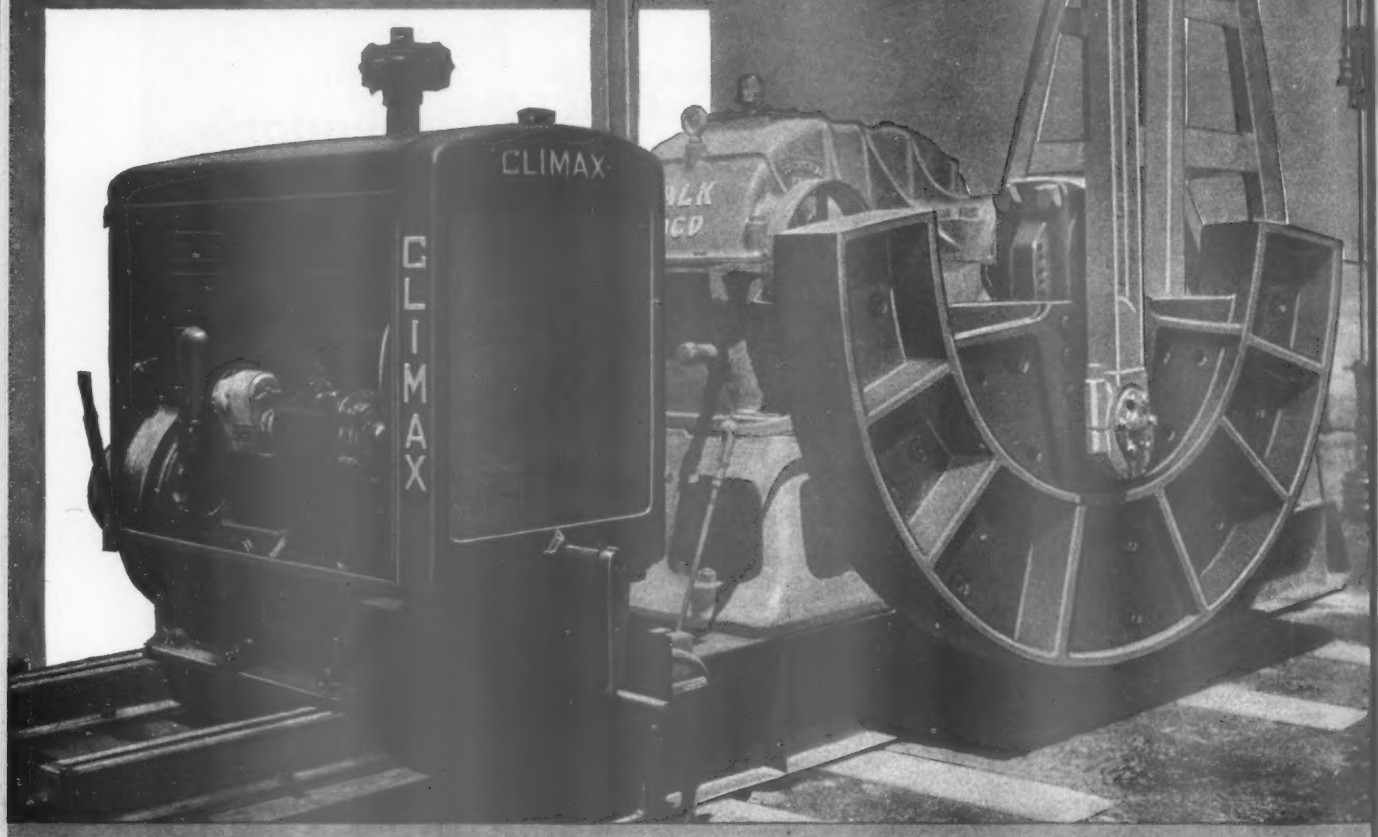

USE Climax Blue Streak ENGINES

These Climax Engines are especially designed for oil well pumping. They help keep oil flowing at low fuel cost, with negligible expense for engine repairs and maintenance.

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Exploration and Drilling

Week's Highlights

THERE are times when little satisfaction is gained from the ability to say "I told you so." On January 8, 1942, The Oil and Gas Journal carried an article showing how drilling in the middle of a 40 was not good policy in those areas in which drilling restrictions might later be lifted. In the issue of September 17, it was shown how operators in Illinois who had drilled on 330-330 locations benefited by an amendment to M-68 permitting 10-acre spacing. This week, The Journal's Rocky Mountain report tells of the difficulties of Kevin-Sunburst operators who have been drilling in the center of 40's and cannot now take advantage of the new rule permitting 10-acre locations because of these wells.

The desire to drill in the middle of a 40, when only one well is permitted comes from old ideas regarding drainage which frequently do not apply. Where the pressure is low, it is questionable if a well will drain even 10 acres. Many cases are known where wells drilled in the middle of depleted and closely spaced wells have yielded good production. Many more will be drilled in such locations with favorable results. It may be that in Kevin-Sunburst it will be found eventually that five wells will be needed to drain a 40 but the fifth well would be more properly drilled last instead of first. The legal standing of offsets, acquired during many years when the law of capture applied has cost the industry a great deal. Many lawyers have caused improper spacing of wells under present wartime regulations because of a fear that postwar drainage suits would be filed if operators followed OPC-PAW orders permitting spacing on equivalently situated 10-acre locations. The growing need for oil can be expected to give rise to many more amendments permitting 10-acre spacing which would make such fears groundless.

WEST TEXAS ELLENBURGER DISCOVERY: The most important discovery of the week and, possibly the most important in many weeks is the finding of oil in the Ellenburger northeast of the old Hendricks pool. Outside of Big Lake, most other Ellenburger discoveries in West Texas are not associated with the major fields. The Embar accumulation in Andrews County may eventually be found to tie in with the Goldsmith trend and the possibility of deep production in many other areas is heightened by the recent find. If the Permian lime and flanking sand fields are found to lie on an old high so that Ordovician oil can be expected on all of the trends of the area, the prediction made by many geologists that the Ellenburger may eventually become as important as the Permian pay may prove justified. If, as A. I. Levorsen says in his article on Discovery Thinking, it is necessary for us to think of new provinces and billions of barrels, rather than new fields and millions of barrels, the Ellenburger of West Texas appears to offer the greatest opportunity today.

EAST TEXAS: A Wood County wildcat southeast of Coke is reported running high. Three other tests are starting in the county (p. 114).

NORTH TEXAS: A record initial flow for the district was established by a Mississippi lime test in the Burns-Ragland pool. It is only during the past year or so that the Mississippi lime was considered a possible pay in the area (p. 118).

KANSAS: A new Viola lime pool has been opened in Pratt County. Trapp has been extended 1 3/4 miles south, opening up a large area for testing (p. 113).

OKLAHOMA: Another extension to the Wilcox producing area in Pottawatomie County is registered by a discovery south and west of the Lake Shawnee pool (p. 123).

COMPLETIONS IN ALL FIELDS . . .

(Week ended April 3, 1943)

	Oil	Gas	Dry	Total	Footage	Total comp. to date 1943	1942
N. Y., Pa., and W. Va.	58	11	1	70	132,051	758	928
Ohio	1	6	7	14	34,734	181	241
Indiana	2	0	1	3	4,472	66	83
Kentucky	0	0	0	0	0	61	67
Illinois	22	1	15	38	92,065	458	428
Michigan	4	0	8	12	31,344	106	157
Kansas	12	1	13	26	83,573	326	374
Nebraska	0	0	1	1	3,478	7	12
Missouri, Iowa	0	0	0	0	0	3	6
Oklahoma	15	2	12	29	105,122	283	382
Texas:							
North Central Texas	4	0	11	15	31,553	274	362
West Texas	15	0	1	16	76,265	211	498
Texas Panhandle	2	0	0	2	6,555	45	140
Eastern Texas	1	0	1	2	11,508	60	124
Texas Gulf Coast	8	0	3	11	68,753	97	233
Southwest Texas	10	1	6	17	92,776	208	361
Total Texas	40	1	22	63	287,410	895	1,718
North Louisiana	1	0	3	4	19,246	71	140
Louisiana Gulf Coast	2	0	1	3	21,280	81	150
Total Louisiana	3	0	4	7	40,526	152	290
Arkansas	2	0	3	5	25,392	56	36
Mississippi and Southeast	0	0	3	3	21,497	14	17
Montana	3	0	1	4	8,498	40	38
Wyoming	0	0	0	0	0	26	24
Colorado, Utah	0	0	0	0	0	3	4
New Mexico	5	0	1	6	17,681	55	65
California	27	0	2	29	85,465	260	229
Total United States	194	22	94	310	973,308	3,750	5,099
Total previous week	177	36	91	304			
Week ended April 4, 1942	173	34	104	311			

PERMIAN BASIN, PANHANDLE

Ellenburger Production Found in Keystone Area, Winkler County

MIDLAND, Tex.—Amon G. Carter C-2 J. B. Walton, SW NE Section 1, Block B-3, Public School Lands, deep wildcat in the Keystone area of Winkler County, bottomed at 9,316 ft., on last reported gage flowed 16½ bbl. distillate in 1 hour along with a large flow of gas from Ellenburger dolomite topped at 9,217 ft. It is being hailed as the opener of another "Big Lake pool." Information on formations encountered has been withheld by the operators, but rumors have persisted that good shows have been passed up in shallower zones. Gulf Oil Corp. and S. W. Richardson are understood to have an interest in the well with Carter. At last report electrical survey had been run, and additional coring was in progress after the hole had been reamed to 9,311 ft.

Andrews County.—Skelly Oil 1-K University, 2 miles east of the Emma pool, cored from 4,425 ft. to 4,440 ft. and recovered 14 ft. saturated porous sand and dolomite, but lost circulation and was conditioning mud. The test is slated to go to 7,500 ft. if the San Andres lime does not pay off.

Hockley County—George P. Livermore, Inc., 1 G. C. Thomas, Lot 29, Ellwood subdivision of League 10, Donley County School Land, logged porosity from 4,948-50 ft., and was drilling ahead below 5,259 ft., to finish contract of 5,500 ft.

Lubbock County.—J. R. Sharp 1 R. D. Martin, western Lubbock County wildcat, topped San Andres lime at 3,730 ft. and was drilling in dolomite at 4,615 ft. It is a Clear Fork test.

Pecos County.—Magnolia Petroleum Co. 1-29 Eaton, Section 29, Block 3, H.&T.C.R.R. Survey, tried drill-stem test in Ellenburger topped at 8,110 ft., but tool failed to open, and another test was to be attempted. Total depth is 8,182 ft.

Ward County.—Shell Oil 3 Sealy-Smith, west outpost to the Monahans Permian pool, total depth 5,817 ft., set packer at 5,607 ft. and was swabbing after drill-stem test from 5,745-63 ft. showed 2 ft. lime with scattered porosity and odor of oil.

DAILY AVERAGE PRODUCTION FOR WEEK

	Apr. 3 crude oil	April PAW quota all oils	Mar. 27 crude oil
Arkansas	70,600	78,600	70,850
California	789,750	823,700	780,150
Colorado	6,075	7,400	6,310
Eastern fields	93,200	114,300	95,300
Illinois	228,500	251,900	230,100
Indiana	15,900	16,000	13,750
Kansas	314,800	309,900	308,900
Louisiana	339,100	359,300	339,250
North Louisiana	*89,100*	.....	*89,250*
Louisiana	*250,000*	.....	*250,000*
Michigan	56,100	63,700	56,400
Mississippi	54,400	50,000	53,700
Montana	22,535	24,600	18,490
Nebraska	2,200	2,600	2,350
New Mexico	105,620	105,700	105,000
Oklahoma	344,000	379,300	345,650
Texas	1,392,650	1,502,000	1,392,650
East Texas	*323,000*	.....	*323,000*
West Texas	*218,000*	.....	*218,000*
North Central Texas	*137,100*	.....	*137,200*
East Central Texas	*99,800*	.....	*99,750*
Texas Panhandle	*88,500*	.....	*88,500*
Texas Gulf Coast	*458,550*	.....	*458,500*
Southwest Texas	*67,700*	.....	*67,700*
Wyoming	94,825	97,100	93,320
Total United States	3,930,255	4,186,100	3,912,170
Total production Jan. 1-Apr. 3, 1943			360,824,610 bbl.
Same period last year			388,687,740 bbl.

WEST TEXAS COMPLETIONS

Wildcats

Castro County: Devore & Slade 1 W. D. Dinwiddie, NE NE Sec. 10, Blk. 9-T, T.&N.O. Ry. Sur., dry, T.D. 5,760 ft.

Fields

Abell, Pecos County: Skelly Oil 1 C. T. Spears, N¼ W¼ S¼ Sec. 5, Blk. 3, H.&T.C. Ry. Sur., elev. 2,394 ft., pump 72 bbl. 44.5-gravity, pay 5,898 ft., "Waddell pay," T.D. 5,907 ft.

Fullerton, Andrews County: Texas Pacific Coal & Oil 2 Emily Jackson, SW NW Sec. 17, Blk. A-32, Public School Land, flow 1,956 bbl., pay 6,730 ft., lime, T.D. 7,225 ft.

North Cowden, Ector County: Carl B. King and Bay Pet. 1-D O. B. Holt, NE NW Sec. 20, Blk. A, Public School Land, pump 101 bbl., 5 per cent water, pay 4,358 ft. lime, shot 500 qt., T.D. 4,395 ft.

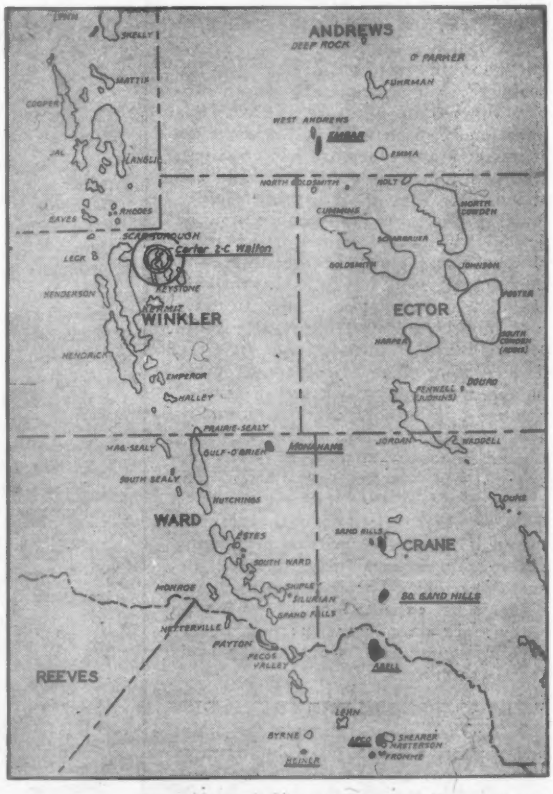
Sand Hills, Crane County: Magnolia Pet. 20 P. J. Lea, NW NW Sec. 9, Blk. 32, Public School Land, elev. 2,609 ft., flow 763 bbl., pay 4,298 ft. lime, T.D. 4,672 ft.

Slaughter, Cochran County: Continental Oil 2-91 Carrie S. Dean, 1,845 ft. from S, 708 ft. from E of N 525-ac. of E 1,050-ac. Lge. 91, Lipscomb County School Land, elev. 3,704 ft., flow 1,537 ft., acid 12,000 gal., T.D. 5,069 ft.

Superior Oil 7 Carrie S. Dean, 440 ft. from S, 2,525 ft. from E, Lge. 57, Martin County School Land, flow 621 bbl., pay 4,929 ft. lime, acid 9,000 gal., T.D. 4,993 ft.

Superior Oil 8 Carrie S. Dean, 440 ft. from S and E, Lge. 57, Martin County School Land, flow 249 bbl., pay 4,910 ft. lime, acid 8,000 gal., T.D. 4,975 ft.

Slaughter, Hockley County: Falcon Co. 3 T. E. Grant, 660 ft. from N and W, Lab. 12, Lge. 42, Rains County School Land,



Southwest Mapping Co., Fort Worth

Map showing location of Amon G. Carter C-2 Walton, new Ellenburger discovery in Winkler County, with relation to other Ellenburger pools in West Texas (underlined). Not shown are the Big Lake and Barnhart pools of Reagan County

elev. 3,406 ft., flow 435 bbl., pay 4,905 ft., acid 8,000 gal., T.D. 4,937 ft.

J. C. Hawkins 12-A Mallet, 580 ft. from N and W, Lab. 23, Lge. 47, Edwards County School Land, elev. 3,637 ft., flow 834 bbl., pay 4,945 ft., acid 11,500 gal., T.D. 4,980 ft.

J. C. Hawkins 29-A Mallet, 580 ft. from S and E, Lab. 17, Lge. 47, Edwards County School Land, flow 687 bbl., pay 4,920 ft., acid 11,500 gal., T.D. 4,965 ft.

T. F. Morrow 19 Mallet, 580 ft. from N and E, Lab. 19, Lge. 48, Edwards County School Land, elev. 3,604 ft., flow 540 bbl., pay 4,900 ft., acid 12,000 gal., T.D. 4,945 ft.

Sharon Ridge, Scurry County: P. J. Moran 1 Magnolia-Chapman, SW SE NW Sec. 100, Blk. 97, H.&T.C. Ry. Sur., elev. 2,239 ft., pump 120 bbl., pay 1,620 ft., shot 120 qt., T.D. 1,730 ft.

West Fuhrman, Andrews County: Phillips Pet. 1-A University, NE NW Sec. 3, Blk. 10, University Sur., I.P. 129 bbl., pay 4,413 ft., acid 2,500 gal., T.D. 4,600 ft.

Seaboard Oil 3 Thornberry, 660 ft. from S, 1,848 ft. from W, Sec. 18, Blk. A-42, Public School Lands, elev. 3,215 ft., flow 99 bbl., pay 4,350 ft., acid 5,000 gal., T.D. 4,597 ft.

World, Crockett County: Oro Peso Oil 5 L. P. Powell, 467 ft. from W, 1,550 ft. from N of lease, Sec. 62, Blk. BB, E.L.& R.R. Ry. Sur., elev. 2,719 ft., pump 97 bbl., pay 2,550 ft. lime, acid 1,000 gal., T.D. 2,575 ft.

SOUTHEAST NEW MEXICO

HOBBS, N. M.—New Mexico activity was revived last week, with a total of eight new locations being staked, two of which were wildcats. Principal interest was centered on the deep test in southeast Lea County being drilled by R. Olsen and Atlantic Refining Co. in 11-25s-37e, which was bottomed at 9,592 ft. in granite. Shows were logged in Simpson at 8,524 ft., and in lower Permian formations at various depths from 4,940 ft. to 5,080 ft., and it is believed casing will be set and perforated opposite these shows. The wildcat of H. L. Hunt 1 Turner & McMillan, Otero County, was abandoned in granite at 2,175 ft.

SOUTHEAST NEW MEXICO COMPLETIONS

Grayburg-Jackson, Eddy County: Superior Oil 2 Foster, NW SE 17-17s-31e, elev. 3,701 ft., flow 43 bbl., pay 3,040-3,460 ft., T.D. 3,468 ft.

Maljamar, Lea County: Johney Cockburn 10-B Pearl Miller, NW SE 25-17s-32e, elev. 4,007 ft., flow 258 bbl., pay 4,006 ft., T.D. 4,215 ft.

Maljamar Oil 14-B Mitchell, SE SW 19-17s-32e, elev. 3,925 ft., flow 276 bbl., pay 3,590 ft., T.D. 3,922 ft.

South Eunice, Lea County: Texas Pacific Coal & Oil 26-A State, NW NE 8-22s-36e, elev. 3,588 ft., flow 168 bbl., pay 3,795 ft., acid 5,000 gal., T.D. 3,890 ft.

Square Lake, Eddy County: W. S. Randall 3 A. N. Etz, SE SW 26-16s-30e, elev. 3,795 ft., flow 145 bbl., pay 2,993 ft., shot 160 qt., T.D. 3,040 ft.

West Lusk, Eddy County: Plains Prod. 5 Jones, NE SE 24-19s-31e, elev. 3,562 ft., dry, T.D. 2,614 ft.

PANHANDLE COMPLETIONS

Gray County: Magnolia Pet. 227-60 fee, 660 ft. from N, 1,320 ft. from No. 52, Sec. 15, Blk. 3, L.&G.N. Ry. Sur., elev. 2,975 ft., I.P. 49 bbl., 10 per cent water, pay 3,020 ft., shot 180 qt., T.D. 3,090 ft.

Moore County: Skelly Oil 1 Mary C. Hight, NE NE Sec. 354, Blk. 44, H.&T.C. Ry. Sur., elev. 3,589 ft., I.P. 41 bbl., 83 per cent water, pay 3,440 ft., T.D. 3,465 ft.

KANSAS, NEBRASKA

Pratt County Wildcat Opens New Viola Lime Pool

A NEW Viola lime pool in northern Pratt County, northeast of the Carmi pool, was in the process of completion late last week but production tests had not been made. The well is Lion Oil Refining Co. 1 H. J. Moeller-Ford, NE NE SE 12-26s-12w. A 25-minute drill-stem test with the packer set at 4,137 ft., 2 ft. in the lime, put 2,550 ft. of 41-gravity oil in the hole. An earlier test in the Lansing-Kansas City lime at 3,697-3,713 ft., recovered 20 ft. of mud. Total depth is 4,145 ft.

Barton County.—A 1¾-mile extension to the Trapp pool was showing for a producer last week at the Vernon Oil & Gas Co. et al 1 Barrett, SE NE SE 36-16s-14w. Operators were setting 5-in. casing after bailing 2 bbl. of oil an hour in Arbuckle lime were porosity was found at 3,463-65 ft., total depth. A show of oil was also found in the Lansing lime at 3,315 ft.

Russell County.—Harry Gore 1 Kastrup, NW NW NW 15-15-12w, between the Dubuque and Greenvale pools, was setting 7-in. casing at 2,982 ft. after bailing 1 bbl. of oil an hour in Lansing lime at 2,979-86 ft.

Stafford County. — The Spangenberg pool was opened by Falcon-Seaboard 1 Spangenberg, N½ NE SE 21-22-12w, south of the Sitner pool and west of Richardson. Operators were building tanks after the well filled 2,400 ft. with oil in 24 hours. Pay is the Arbuckle at 3,691-97 ft., total depth.

Reno County.—Six miles south of the tip of Burrton pool, Barnsdall Oil Co. 1 Morland, SW SW SE 36-25-5w, was plugging back to the Mississippi lime, where a show of oil was found at 3,592 ft., when the hole started filling with water after the plug was drilled out in Misener sand at 3,977 ft.

Barber County.—In the northwest corner of the county, Aladdin Petroleum 1 National Gypsum, SW NW SE 20-30-15w, had 100 ft. of 38-gravity oil in the hole in 1 hour after cleaning out to 4,451 ft., total depth.

KANSAS COMPLETIONS

Wildcats

Barton County: Bartlett et al 1 McCann-Campbell, N½ NW NE 24-17-15w, dry, T.D. 3,511 ft., Lansing 3,206 ft., conglomerate 3,445 ft., Arbuckle 3,475 ft.

Decatur County: Helmerich & Payne and Phillips 1 Savage, NE NE NE 3-1-27w, dry, T.D. 3,680 ft., Lansing 3,307 ft., granite wash 3,646 ft., granite 3,676 ft.

Ellis County: Mid-Continent 1 Fischer, NE NE NE 8-11-20w, dry, T.D. 3,686 ft., show oil and water, Lansing 3,353 ft., Marmaton 3,562 ft., Arbuckle 3,673 ft.

Ellsworth County: Appleman and Bradley Bros. 1 Becker, SE SE SE 2-17-9w, dry, T.D. 3,283 ft., Lansing 2,907 ft., Simpson sand 3,245 ft.

McPherson County: Auto-Ordnance 1 Larson, SE SE NW 22-18-4w, dry, T.D. 3,815 ft., Lansing 2,497 ft., Mississippi lime 3,144 ft., Viola 3,609 ft., Simpson sand 3,707 ft. with show of oil, D.S.T. recovered mud, Arbuckle 3,776 ft.

Stafford County: Falcon-Seaboard and Phillips 1 Redetzke, N½ NE NE 5-24-14w, dry, T.D. 4,150 ft., Lansing 3,632 ft., conglomerate 3,960 ft., Simpson 4,065 ft., Arbuckle 4,106 ft.

Continental 1 G. W. James, SE SE SW 36-24-13w, dry, T.D. 4,234 ft., Lansing 3,592 ft., Viola 4,007 ft., Simpson shale 4,113 ft., sand 4,124 ft., Arbuckle 4,179 ft.

Fields

Bemis, Ellis County: Gulf 1 Thurston, SW NE 18-11-16w, dry, T.D. 3,334 ft., Arbuckle 3,328 ft.

Chase, Rice County: Aylward Prod. 1 Rolfs, SW NW 20-19-9w, 1,794 bbl., swabbed 65 bbl. an hr., Arbuckle 3,227-42 ft.

Curtis, Stafford County: Vickers and McMorrow 2 Curtis, S½ SE NW 6-22-13w, dry, T.D. 3,720 ft., Viola 3,711 ft.

Eldorado, Butler County: Harry Wilson 1-A Robinson, W½ NW SE 17-25-5e, pumped 144 bbl., Mississippi lime 2,565-69 ft.

Haferman, Rice County: Duwe & Farris 2 Wiens, NW NE 6-19-9w, dry, T.D. 3,298 ft., Arbuckle 3,292 ft.

Holcomb, Kearny County: Kansas Nat. Gas 1 Frost, C 5-25-35w, 25,000,000 cu. ft. gas, lime 2,417-2,652 ft., acidized with 10,000 gal.

Iuka, N. Pratt County: Skelly 2-B Knop, SW SE SE 25-26-13w, flowed 135 bbl. in 3 hr., Arbuckle 4,313-29 ft.

Kraft-Prusa, Barton County: Hinkle Oil 2 Krautwurst, SW SE 34-16-11w, dry, T.D. 3,406 ft., Arbuckle 3,394 ft.

Gulf 2 Staudinger, SE SW SE 7-16-11w, pumped 112 bbl., Arbuckle 3,260-63 ft.

Lindsborg, McPherson County: Auto-Ordnance 3 Bean, W½ NW NE 36-17-4w, pumped 561 bbl., Viola 3,389-97 ft.

Auto-Ordnance 5 Bengstrom, W½ SW NE 25-17-4w, 1,742 bbl., swabbed 188 bbl. in 4 hr., Viola 3,384-89 ft.

Dickey Oil 1 Frantz, W½ SE SE 24-17-4w, pumped 441 bbl., Viola 3,381-87 ft.

Lost Springs, Marion County: Lorian Harrington 2 Honska, NW NE 5-18-4e, pumped 5 bbl., Mississippian chat 2,397-2,418 ft., T.D. 2,437 ft.

Bob Youker 1 Martin, W½ SE SW 34-16-4e, pumped 128 bbl., chat 2,269-32 ft.

Westgate-Greenland 2 Williams, W½ SW SE 4-17-4e, pumped 50 bbl., chat 2,312-39 ft.

Ring-Mac Oil 4 Kaiser, W½ SE SE 33-17-4e, pumped 35 bbl., chat 2,367-87 ft.

McLouth, Leavenworth County: Magnolia 1 Jeannin, NE NW 7-10-21e, pumped 18 bbl., sand 1,386-1,412 ft.

Oxford W., Sumner County: Blair and Summitt Drlg. 2 Barns, NW SW NE 17-32-2e, dry, T.D. 3,011 ft., Kansas City 2,797 ft.

Stoltenberg, Ellsworth County: Magnolia 1-A Wamhoff, SW NE 26-16-10w, dry, T.D. 3,430 ft., Arbuckle 3,392 ft.

FOREST CITY BASIN

ST. JOSEPH, Mo.—O. R. Newcomer

et al 1 Acock had rigged up a portable rotary for a Bartlesville sand test 2 miles south of the Cities Service Oil Co.'s discovery well in Atchison County, Missouri. No. 1 Acock will be drilled in SW SE NW 8-64n-39w. This is 3 miles east and 2½ miles north of Fairfax. The test is the first since Cities Service brought in the first deep well for Missouri.

Ferguson & Towle 1 Ehbauer in NW NW NE 2-2n-15e, Richardson County, Nebraska, gun-perforated casing opposite a potential pay zone in the Hunton lime, but no oil showed. Three potential pays were indicated by electric log survey and the operators will next try the other two.

Charles Miller 1 Jeannin, now Magnolia Petroleum Co. 1 Jeannin in NE NW 7-10s-21e, Leavenworth County, Kansas, was completed as an oil well in the McLouth pool. The well yielded 21 bbl. of oil in 6 hours on the pump. The hole was shot with 40 qt. from 1,384 ft. to 1,412 ft., the latter depth being the top of Mississippi lime.

NEBRASKA COMPLETIONS

Furnas County: Helmerich & Payne 1 Hamilton, SE SE SE 31-1n-24w, dry, T.D. 3,478 ft., Topeka 3,064 ft., Lansing-Kansas City 3,221 ft., granite wash 3,455 ft., granite 3,475 ft., show dead oil 3,374 ft.

EASTERN TEXAS

Wildcat South of Coke Field Reported Running High

DALLAS, Tex. — Interest in East Texas was centered on Wood County, as three new tests were announced for the county, and a wildcat was running high with royalty under the drill site commanding a price of $450 per acre. Bobby Manziel 1 W. F. Bailey, Samuel Burch Survey, 5 miles southeast of the Coke pool, was drilling below 6,100 ft. looking for top of Paluxy sand. Woodbine sand showed water, but the well was running considerably higher than the nearest dry hole on this formation, and operators concede it has a good chance to produce from the Paluxy. Three miles southwest of the Coke pool and 5 miles north of the Quitman pool Murray Sells staked location for his No. 1 J. C. Morgan in the southeast corner of an 82.5-acre tract in the Harvey Hall Survey. Six miles east of the Quitman pool, Jackson & Fisher took half of the acreage assembled by Danciger Oil & Refining Co. and will drill a Paluxy test on the McCarley tract in the H. Anderson Survey 274. Rowan Drilling Co. is adding to its block in the northeast part of the county and will probably announce location for a test in the near future.

Henderson County.—Contract depth of 8,500 ft. had been reached in Stanolind Oil & Gas Co. 1-B Tri Cities unit, and the zone at 7,750 ft. will be tested. It is this zone that produces in the distillate discovery of British-American Oil Production Co.

Hunt County. — Humble Oil & Refining Co. 1 F. F. Graham, Smackover test northwest of the Weiland pool, set 9⅝-in. casing at 3,925 ft. and was drilling ahead. Woodbine had been topped at 2,972 ft. with no shows reported. Stanolind 1 Tilson heirs, C. C. Dale Survey northwest of Commerce, set casing at 4,450 ft. Excitement ran high when drill-stem test showed 270 ft. oily mud when open 10 minutes from 4,373-91 ft., but then showed 1,320 ft. of brackish water.

EAST TEXAS COMPLETIONS

Fields

Rusk, Cherokee County: L. O. McMillan and M. Nathan 1 Huggins, 660 ft. from S, 660 ft. from NW cor. 5-ac. tract, Levi Jordan Sur., elev. 376 ft., dry, T.D. 5,150 ft.

Quitman, Wood County: Amerada Pet. 1 J. J. Blalock, 543 ft. from S, 660 ft. from E of lease, W. W. Lanier Sur., elev. 449 ft., flowed 936 bbl. pay 6,212 ft. Paluxy sand, T.D. 6,358 ft.

APPALACHIAN FIELDS

Much Drilling Anticipated In Eastern Gas Fields

PITTSBURGH, Pa.—From the number of new locations made in the lower eastern fields, it appears that the major companies intend drilling much of their reserves during the year. The reserves, however, will continue in the gas areas and little is expected from the present outlook in new oil production. In Pennsylvania and West Virginia, there are no new oil pools to be exploited and at the best local lenses to be extended if conditions warrant the drilling. The Supplemental Order 1 to Petroleum Order Order 11 which replaces Conservation Order M-68, now revoked, eases oil drilling for the independent operator as, except in rare locations, few exceptions will have to be applied for.

SOUTHWEST PENNSYLVANIA

Westmoreland County.—On Laurel Ridge in Ligonier Township, Westmoreland County, New Penn Development Co., William E. Enee et al ran casing in the test on the John and Eleanor Beck farm to 7,295 ft. and are now drilling ahead at 7,325 ft. The Onondaga may be reached in the next 200 ft.

Fayette County. — On Chestnut Ridge in South Union Township, Fayette County, Peoples Natural Gas Co. cased 1 Walters to 6,922 ft. with the top of the Tully at 6,921 ft. Here, New Penn Development Co., William E. Snee et al are drilling in brown shale at 7,465 ft. in 2 Indian Creek Coal Co.

Garrett County, Maryland. — The test of William E. Snee et al on the Speicher farm on the Accident dome in Garrett County, Maryland, is drilling at 7,173 ft. with the tools now 29 ft. below the crushed lime used to straighten the hole. Tools action is still not good.

SOUTHWEST PENNSYLVANIA COMPLETIONS

Armstrong County, Kiskiminitas Township: T. W. Phillips Gas & Oil Co. 1 R. M. Burns, 94,000 cu. ft. gas, Bradford sand, T.D. 3,471 ft.

Madison Township: Campbell et al 1 Mrs. E. Williams, 70,000 cu. ft. gas at 918 ft., Murraysville sand, T.D. 2,510 ft.

Clarion County, Red Bank Township: Owens-Illinois Glass Co. 1 Ralph Wolfgang, 52,000 cu. ft. gas, Speechley sand, T.D. 2,611 ft.

Fayette County, German Township: Duquesne Gas Co. 1 William Ewart, 40,000 cu. ft. gas, Fifth sand 2,481-2,545 ft., gas 2,481-87 ft., T.D. 2,709 ft.

Greene County, Perry Township: Carnegie Natural Gas Co. 1 F. M. Brock, drilled deeper from oil pay in Fifth sand, started 3,212 ft., Bayard sand 3,309-27 ft., gas 3,323-25 ft., Bayard stray 3,331-51 ft., gas 3,344-46 ft., T.D. 3,407 ft.

WEST VIRGINIA

In Ripley district, Jackson County, the test of the United Fuel Gas Co. and the United Carbon Co. jointly on the D. J. Rogers farm appears as though it will be completed as a fair gas well but like quite a few other wells in the district is also showing some oil. The elevation is 728 ft., Big lime 1,767 ft., Berea 2,377 ft., Corniferous lime 4,940 ft., Oriskany 5,049 ft., gas 5,056-65 ft. It gages 1,494,000 cu. ft. gas at 5,065 ft. and has about 21 ft. of oil in the hole.

McDowell County. — In Browns Creek district, McDowell County, the test of Godfrey L. Cabot, Inc., shut down at 6,190 ft. with a fishing job after a gas pocket was struck at that depth which blew the tools up the hole.

WEST VIRGINIA COMPLETIONS

Cabell County, Barboursville district: Jesse H. Chaffin 1 C. S. Berkley, 42,160 cu. ft. gas, Big lime 1,485 ft., Injun 1,166 ft., Berea 2,302 ft., bzrown shale 3,029 ft., R.P. 480 lb., T.D. 3,342 ft.

Lincoln County, Duval district: South Penn Natural Gas Co. 4 Jonas V. Alford, 158,000 cu. ft. gas, second Salt 1,075 ft., Big lime 1,683 ft., gas 1,754-64 ft., T.D. 1,775 ft., may acidize.

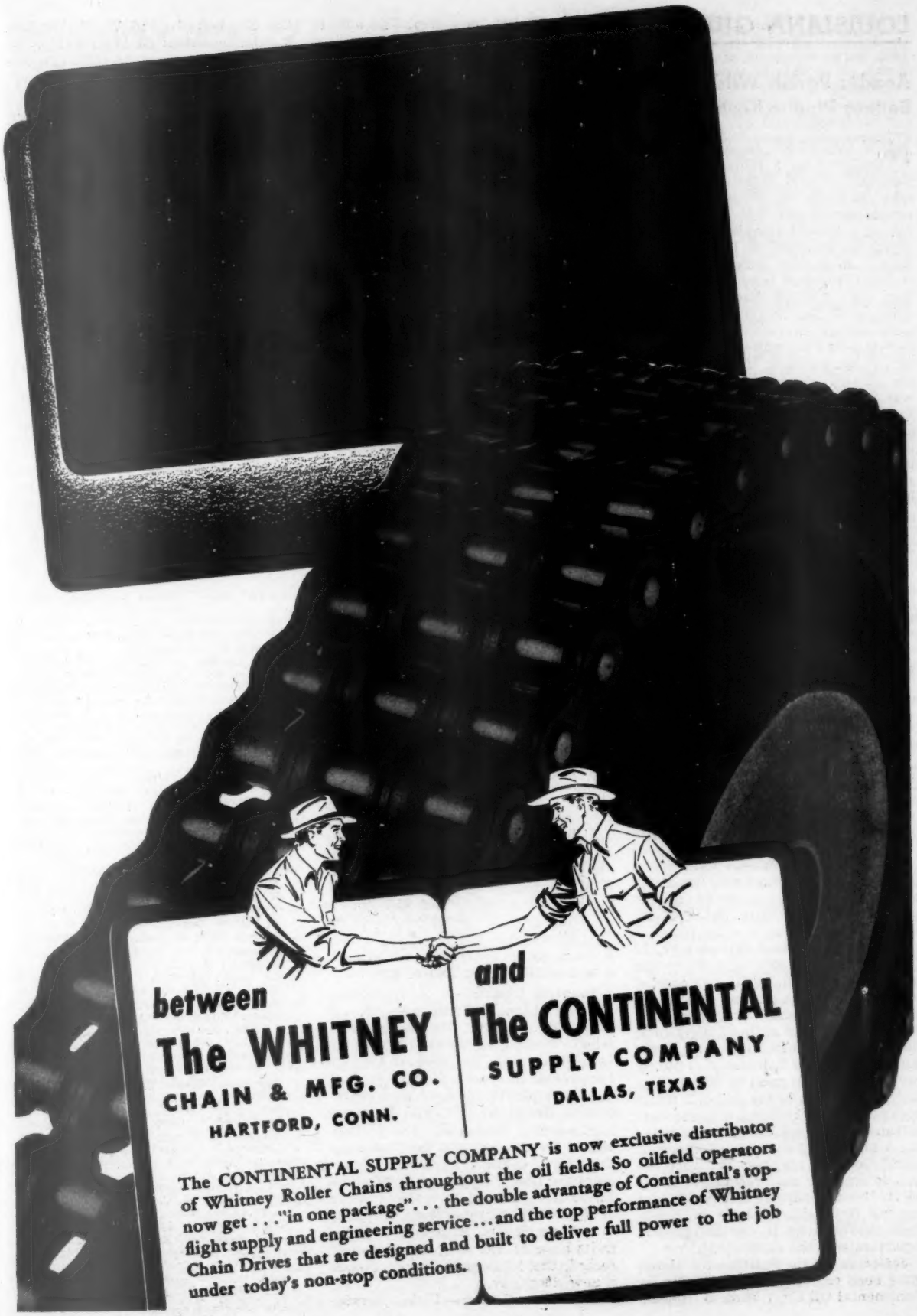
Putnam County, Pocatalico district: Godfrey L. Cabot, Inc., 1080 Hatfield-Campbells Creek Coal Co., 735,000 cu. ft. gas before acidizing, Big lime 1,702 ft., gas 1,823-26 ft., T.D. 1,840 ft.

Godfrey L. Caoot, Inc., 1087 Hatfield-Campbells Creek Coal Co., 1,547,000 cu. ft. gas, Big lime 1,590 ft., gas 1,674-82 ft., T.D. 1,730 ft.

Wetzel County, Grant district: Carnegie Natural Gas Co. 6 Wilson Ney heirs, drilled deeper, 391,500 cu. ft. gas, Big lime 2,013 ft., Big Injun 2,100 ft., Gordon 2,814 ft., completed in Fifth sand, T.D. 3,068 ft.

Jackson County, Ripley district: West Virginia Gas Corp. and Spartan Gas Co. 2 B. F. Rader, 3,080,000 cu. ft. gas, Oriskany 5,155 ft., gas 5,170-75 ft., T.D. 5,180 ft.

Godfrey L. Cabot, Inc., 1058 J. L. McLean heirs, 36,000 cu. ft. gas after shot, 5,069 ft., Oriskany 5,169-5,238 ft., will plug and abandon, T.D. 5,288 ft.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LOUISIANA GULF

Acadia Parish Wildcat Setting Pipe to Test

NEW ORLEANS, La. — The 1 J. R. Daily et al, a joint operation of Sun Oil Co. and Standard Oil Co. of Ohio, in 31-9s-1w, Acadia Parish, was preparing to set 7-in. casing after taking side-wall samples. The well is bottomed at 10,868 ft. In the issue of March 25 it was stated erroneously that this test had been taken over by Sun after the hole had reached contract depth. Sun and Standard of Ohio were jointly interested in the well at the start and are still jointly interested. Union Sulphur Co. 1 Gueno, in the Branch area of Acadia Parish, was drilling at 10,160 ft. in hard shale in the second sidetracked hole. Its companion, 2 Gueno, drilled as a relief well for No. 1 when the latter blew out and caught fire, is now standing at total depth of 10,317 ft. in shale, plugged back to 10,160 ft.

LOUISIANA GULF COAST COMPLETIONS

Fields

Bayou Choctaw, Iberville Parish: Solvay Process Co. 2 Wilbert, 52-9s-11e (salt test), dry at 1,667 ft.

East Hackberry, Cameron Parish: Union Sulphur Co., Inc., State 410 Watkins, Well 2, 24-12s-10w, 145 bbl. through 8/64-in. choke, T.P. 940 lb., C.P. 1,000 lb., gas-oil ratio 482, perf. 5,045-60 ft., T.D. 5,819 ft., P.B. 5,108 ft.

Port Barre, St. Landry Parish: William Helise and Danciger 1 Futrel et al, 7-6s-6e, 33 bbl. distillate through ¼-in. choke at top and 12/64-in. choke at bottom, T.P. 1,000 lb., S.I. T.P. 2,000 lb., gas-oil ratio 90,000, T.D. 7,310 ft., P.B. 4,475 ft. and sidetracked, drilled to 6,484 ft.

Venice, Plaquemines Parish: Tide Water et al 20 Buras Levee District, 28-21s-30e, O.W.W.O., old P.B. T.D. 11,050 ft., P.B. 9,492 ft., and D.O. to 10,032 ft., 219 bbl. through ⅛-in. choke, T.P. 1,575 lb., gas-oil ratio 980, perf. 9,969-80 ft.

Beauregard Parish.—General Crude Oil Co. 1 C. S. Baldwin, which is opening a new field, is closed in. It is planned to install ⅛-in. choke, clean the well and then shut in for installation of tanks. It was drilled to 9,412 ft. and plugged back to 6,575 ft. In a test last week the well was opened on ⅛-in. positive tubing choke. It showed tubing and casing pressures of 1,090 lb. Within an hour the tubing pressure was 650 lb. and casing pressure 1,075 lb. In 3 hours the tubing pressures had dropped to 500 lb. The well was shut in at the end of 5 hours because it was making a great deal of sand. It was estimated to be making 6 bbl. net of oil hourly. The well was killed and preparations were begun to squeeze perforations at 6,512-24 ft. It was believed salt water was coming from either above or below these perforations. It was designed to reperforate in the same level.

Jefferson Davis Parish.—No shows have been reported from tests run by Continental Oil Co. 1 Flora B. Hopson in the Niblett field area. The hole is at 11,285 ft. in shale, and preparations were under way to set casing.

St. James Parish. — After setting protective casing in its 1 Panno & Bosetta, now at 10,750 ft. in shale, Humble Oil & Refining Co. was preparing to resume drilling. It is intended to explore to the 11,500-ft. level. Thus far no encouraging shows have been reported.

West Baton Rouge Parish. — Amerada Petroleum Corp. cemented 5½-in. casing at 9,574 ft. in its 1 Harry B. Nelson, 2½ miles southwest of Port Allen. It was preparing to drill deeper, using 2½-in. tubing. At 9,480 ft. sand with a slight gas odor was recovered.

TEXAS GULF COAST

Katy Development Awaits Decisions of Committee

HOUSTON, Tex.—No report has been made yet by the committee appointed to study problems created by discovery of an excellent oil sand in the Katy gas-distillate area of Waller and Harris counties, and until it does so development work will be held up. The committee, composed of representatives from the Petroleum Administration for War and operators who have holdings in the affected area, held its first meeting March 27 in Houston at the call of D. E. Buchanan, director in charge for District 3 of the PAW. Mr. Buchanan said this week that nothing would be made public concerning the committee's deliberations until after a definite program for the field had been agreed upon. The well which has brought about various new questions for solution is the Stanolind Oil & Gas Co. 1 G. T. Pattison, in the J. M. Bennett Survey of Waller County, producing 153 bbl. of 45.3-gravity oil from pay at 6,622-25 ft. It is the first oil strike in a field which, opened 8 years ago, is estimated to hold from 5 to 6 trillion cubic feet of gas.

Brazoria County.—J. S. Abercrombie and Magnolia Petroleum Co. 1-B McDonald, in the Old Ocean field, which seemed to be on its way toward becoming the deepest well in the world, has been forced to abandon its objective by mechanical difficulties. Bottomed at 14,378 ft., where it ran into a fishing job, the McDonald is the deepest test in Texas and the third deepest anywhere. Operators are now plugging back to about 12,400 ft., planning to make a series of squeeze jobs preparatory to testing at various levels. Although it failed in its hope of attaining the deep-well record, the McDonald may yet open a new deep pay.

Chambers County.—Cities Service Oil Co. 1 A. L. and W. C. Witcher, 2 miles northeast of Alief, was coring at 7,635 ft. It topped the Heterostegina at 3,920 ft., Textularia Warreni 5,685 ft., Glavuslina 5,985 ft., Marginulina Cocoensis 6,310 ft., Massalina Pratti 6,360 ft., Hockleyensis 6,460 ft. Standard Oil of Texas 1-136 State, 2 miles northwest of Smith Point, was completed dry at 10,004 ft. A series of tests is said to have yielded nothing more encouraging than gas and oil odors.

San Jacinto County.—Ohio Oil Co. 1 J. C. Brewer, 6½ miles southwest of Shepherd, was drilling in shale at 6,330 ft. It found the Textularia Warreni at 4,160 ft., Massalina Pratti 4,330 ft., Hockleyensis 4,380 ft., Cockfield 5,240 ft.

Wildcat operations. — New work started in Chambers County: Cox & Hamon 1 W. C. Tyrell, 5 miles northwest of Stowell; Standard Oil Co. of Texas et al 1-17-D State, 5 miles southwest of Anahuac. Harris County: Sun Oil Co. 1 Maggie Mansell, 2½ miles north of Katy. Jackson County: Stanolind 1 Four Way Ranch, 3½ miles southeast of Maurbro. Wharton County: Continental Oil Co. 1 Louisa G. Peterson, J. Villa Survey, Section 3.

TEXAS GULF COAST COMPLETIONS

Wildcats

Chambers County: Standard Oil Co. of Texas 1-136 State, 2 mi. NW of Smith's Point, dry at 10,004 ft.

Jackson County: Humble 1 A. C. Isaacson, 3½ mi. SE of Toro, dry at 6,760 ft.

Shield Oil Co. 1 Henderson & Pickering, 5 mi. NW of La Salle, dry at 6,280 ft.

Waller County: Stanolind 1 G. T. Pattison, Katy field area, J. M. Bennett Sur., 154 bbl. through ½-in. choke, T.P. 1,800 lb., gas-oil ratio 2,364, perf. 6,622-25 ft., T.D. 8,000 ft.

Fields

Boling, Wharton County: Danciger Oil & Refining Co. 2 A. A. Mullins, S. F. Austin Sur., A-2, 526 bbl. through ¼-in. choke, T.P. 530 lb., C.P. 820 lb., gas-oil ratio 420, perf. 2,971-3,025 ft., T.D. 3,070 ft., P.B. 2,998 ft.

3 A. A. Mullins, 247 bbl. through ¼-in. choke, T.P. 360 lb., gas-oil ratio 378, T.D. 2,763 ft.

Buckeye, Matagorda County: United North & South Development Co. 1 R. A. Wendt, G. M. B. Cotton Sur., 103.68 bbl. through ⅜-in. choke, jetting, perf. 8,113½-16 ft., T.D. 8,192 ft.

Lovell Lake, Jefferson County: Humble 4 B. A. Steinhagen, William Carr Sur., A-102, O.W.W.O., old T.D. 7,790 ft., cleaned out to bottom, 22.06 bbl. through 3/32-in. positive choke, T.P. 225 lb., S.I. C.P. 1,600 lb., gas-oil ratio 612.

Mayo, Jackson County: Lon Glasscock 2 J. M. Heard, Morris & Cummings Sur., 17.5 bbl. through open tubing, jetting, with 450 lb. input pressure, perf. 5,100-04 ft., T.D. 7,260 ft.

Salt Dome Oil Corp. 2-A F. A. Ratliff, W. H. Robertson Sur., A-404, 99 bbl. through 7/64-in. choke, T.P. 1,200 lb., gas-oil ratio 1,172, perf. 5,087-99 ft., T.D. 5,108 ft.

North La Ward, Jackson County: Hewett & Daugherty 4 W. C. Owen, P. Scott Sur., A-69, 57 bbl. through 3/32-in. choke, T.P. 1,215 lb., C.P. 1,975 lb., gas-oil ratio 1,614, perf. 5,205-08½ ft., T.D. 5,625 ft.

West Ranch, Jackson County: Magnolia A-246 West Ranch, V. Garcia Sur., 121 bbl. through 7/64-in. choke, T.P. 750 lb., C.P. 950 lb., gas-oil ratio 391, perf. 5,757-62 ft., T.D. 5,763 lb.

Expect Increased Drilling In Heavy-Gravity Fields

LOS ANGELES, Calif. — California drilling operations which have been maintained at a reasonably high level for the past several months due to increased work in fields producing heavy gravity crude oil are expected to increase within another 60 days due to the higher prices for low-gravity oil. Before any great increase can take place, however, it will be necessary to relax provisions of PAO 11 and make available material necessary for drilling and producing activities. Wilmington operators who recognize the necessity of developing additional production of low-gravity crude have been trying to effect authorization for drilling the tar zone for more than a year but have been prevented from participating in the present development program by the well-spacing order. It is interesting to note that while OPA has given the necessary stimulant by increasing prices PAW, on the other hand, still adheres to a provision that prevents development of a reserve estimated to be between 35,000,000 and 50,000,000 bbl. of low-gravity crude oil.

East Strand.—Tide Water Associated Oil Co. established the southern limits of production in the East Strand field by getting a dry hole in 32-17 Kern County Land. This outpost, drilled south of the discovery well, is located in 17-30s-26e and was abandoned at 8,400 ft. The Stevens sand of Miocene age, found in the discovery well to the north, was barren and consisted of gray sand. Top of the gray sand was cored at 8,240 ft. and the only thing found was a few thin stringers of oil sand at 8,208 ft. The N point was at 7,842 ft. Abandonment of this well is interesting because Continental Oil Co. got more showings in a wildcat drilled southeast of this location but failed to develop commercial production.

SAN JOAQUIN VALLEY COMPLETIONS

Belridge, South, Kern County: General Petroleum Corp. 40-12 Belridge, 12-29s-21e, pumped 59 bbl. net, 13.5-gravity, 25 per cent cut, T.D. 1,090 ft., 100-mesh perf. 925-1,088 ft., completed in upper Belridge zone of Pleistocene age.

General Petroleum Corp. 19-2 Belridge, 2-29s-21e, pumped 58 bbl., 14.5-gravity, 2 per cent cut, T.D. 865 ft., perf. 635-741 ft., 752-857 ft., completed in upper Belridge zone of Pleistocene age.

Ohio Oil Co. 15 Hopkins fee, 4-29s-21e, pumped 26 bbl., 14.1-gravity, 1 per cent cut, T.D. 769 ft., perf. 676-769 ft., completed in upper Belridge zone of Pleistocene age.

Ohio Oil Co. 16 Hopkins fee, 4-29s-21e, pumped 10 bbl. net, 13.6-gravity, 95 per cent cut, T.D. 815 ft., perf. 651-775 ft., completed in upper Belridge zone of Pleistocene age.

Cana wildcat district, Butte County: Getty, Pacific Western, Ind. Exploration Co. 1 Cana, 11-23n-1w, abandoned in serpentine basement, T.D. 6,939 ft., had small gas showings.

Coalinga, East, Fresno County: Standard Oil Co. 23-35-A fee, 35-19s-15e, pumped 85 bbl., 20.2-gravity, 1.3 per cent cut, T.D. 3,470 ft., 60-mesh perf. 3,333-3,443 ft., completed in East Coalinga zone of Pliocene age.

Standard Oil Co. 112-35-A fee, 35-19s-15e, pumped 58 bbl., 20.5-gravity, 1 per cent cent, T.D. 3,175 ft., P.B. 3,146 ft., 60-mesh perf. 3,030-3,141 ft., form. test at 3,153-75 ft., est. gas 5,000,000 cu. ft. daily rate, plugged off gas interval and completed in East Coalinga zone of Pliocene age.

Standard Oil Co. 62-3-C fee, 3-20s-15e, pumped 130 bbl., 19.3-gravity, 3.3 per cent cut, T.D. 3,550 ft., perf. 3,360-3,547 ft., completed in East Coalinga zone of Pliocene age.

Edison, Kern County: Jergins Oil Co. 14 Texas fee, 23-30s-29e, pumped 101 bbl., 21.9-gravity, 12.5 per cent cut, T.D. 2,056 ft., 1,913 ft., 250-mesh perf. 1,775-1,885 ft., bottomed in granite basement, completed in Santa Magarita of Miocene age.

Lost Hills, Kern County: University Consolidated Oil Corp. 52 fee, 32-26s-21e, pumped 43 bbl. net, 15.4-gravity, 34 per cent cut, T.D. 1,624 ft., 80-mesh perf. 1,105-1,624 ft., completed in Lost Hills zone of Pliocene age.

Midway-Sunset, Kern County: Chanslor-Canfield Midway Oil Co. 52-9 fee, 9-32s-23e, pumped 5 bbl. net, 16.6-gravity, 70 per cent cut, T.D. 1,600 ft., completed in upper Midway zone of Pliocene age.

Chanslor-Canfield Midway Oil Co. 55-9 fee, 9-32s-23e, pumped 22 bbl. net, 19-gravity, 42 per cent cut, T.D. 3,228 ft., P.B. 2,878 ft., perf. 2,585-2,677 ft., 2,793-2,877 ft., top Wilhelm sand 2,734 ft., top gusher sand 2,811 ft., completed in Wilhelm and gusher sands of Pliocene age.

North American Oil Consolidated 7-A Lockwood, 16-32s-23e, pumped 23 bbl. net, 12-3-gravity, 20 per cent cut, T.D. 1,320 ft., P.B. 1,200 ft., 200-mesh perf. 859-1,190 ft., completed in upper Midway zone of Pliocene age.

North American Oil Consolidated, 6 Midway-Sunset, 2-32s-24e, pumped 45 bbl., 26.9-gravity, 1.2 per cent cut, T.D. 3,862 ft., perf. 3,725-3,861 ft., completed in Midway zone of Pliocene age.

Richfield Oil Corp. 6 Fairfield, 11-31s-22e, pumped 118 bbl. net, 15.1-gravity, 24 per cent cut, T.D. 1,300 ft., perf. 1,183-1,295 ft., completed in Midway zone of Pliocene age.

Standard Oil Co. 17-19-D fee, 19-32s-24e. flowed 311 bbl., 24.1-gravity, 0.6 per cent cut, 205,000 cu. ft. gas, 24/64-in. bean, flow pressure 335 lb., T.D. 3,438 ft., P.B. 2,600 ft., 60-mesh perf. 2,545-98 ft., lower part of hole tested wet necessitating plug, completed in Midway zone of Pliocene age.

Mount Poso, Kern County: Ring Oil Co. 15-29 Bowles, 29-26s-28e, pumped 90 bbl. net, 15.6-gravity, 16 per cent cut, T.D. 1,764 ft., 140-mesh perf. 1,739-64 ft., completed in Vedder zone of Miocene age.

Union Oil Co. 15 McLeod, 34-31s-23e, pumped 117 bbl. net, 21.8-gravity, 35 per cent cut, T.D. 3,580 ft., 60-mesh perf. 2,923-73 ft., 3,176-3,210 ft., 3,282-92 ft., 3,312-32 ft., 3,506-37 ft., 3,563-76 ft., completed in North Midway zone of Pliocene age.

Ring Oil Co., 17-29 Bowles, 29-26s-28e, pumped 85 bbl., 15.5-gravity, 0.5 per cent cut, T.D. 1,723 ft., perf. 1,698-1,723 ft., completed in Vedder zone of Miocene age.

Ring Oil Co. 18-29 Bowles, 29-26s-28e, pumped 92 bbl., 15.5-gravity, 0.5 per cent cut, T.D. 1,691 ft., perf. 1,666-91 ft., completed in Vedder zone of Miocene age.

Ring Oil Co. 19-29 Bowles, 29-26s-28e, pumped 94 bbl., 15.6-gravity, 0.5 per cent cut, T.D. 1,729 ft., 140-mesh perf. 1,704-29 ft., completed in Vedder zone of Miocene age.

Riverdale, Fresno County: Amerada Petroleum Corp. 56-15 Brum, 15-17s-19e, flowed 225 bbl., 33.8-gravity, 0.3 per cent cut, 58,000 cu. ft. gas, 10/64-in. bean, pressures 650/100 lb., T.D. 6,900 ft., gun perf. 6,570-80 ft., 6,585-6,610 ft., 6,615-25 ft., completed in Lawton zone of Miocene age.

Round Mountain, Kern County: Shell Oil Co. 25 Caldwell, 7-28s-29e, pumped 165 bbl., 15.5-gravity, 6 per cent cut, T.D. 2,012 ft., 125-mesh perf. 1,967-2,012 ft., completed in Vedder zone of Miocene age.

Round Mountain wildcat district, Kern County: Iseminger Brothers 1 Round Mountain, 2-28s-28e, abandoned in gray sand; Vedder zone of Miocene age was barren; T.D. 2,113 ft., no showings logged.

Another Buena Vista Test Being Abandoned

As had been expected for the past 2 weeks, Texas Co. has started abandonment of 5-1-J, a wildcat in the Buena Park district, and this may mean the suspension of drilling in that area for some time to come. Interest in the possibilities of the district cooled off very perceptibly several months ago when the area failed to run true to expectations. The Buena Park field is producing approximately 175 bbl. per day from two wells and this may be a good reason for continuance of drilling. It is tough to write off as not justifying additional drilling an area that is actually producing 175 bbl. per day of crude oil.

LOS ANGELES BASIN COMPLETIONS

Brea Olinda, Orange County: Union Oil Co. 75 Stearns, 7-3s-9w, pumped 175 bbl., 18.9-gravity, 5.5 per cent cut, T.D. 6,425 ft., P.B. 3,160 ft., perf. 2,303-3,158 ft., no appreciable showings in lower part of hole, completed in Stearns zone of Pliocene age.

Huntington Beach, Orange County: Standard Oil Co. 41-A Huntington, 3-6s-11w, pumped 169 bbl., 17.7-gravity, 1.3 per cent cut, T.D. 3,590 ft., perf. 3,209-3,588 ft., completed in lower Bolsa zone of Pliocene age.

Montebello, Los Angeles County: Kern Oil Co. 45 Monterey, 2-2s-12w, pumped 85 bbl., 19.6-gravity, 30 per cent cut, T.D. 3,297 ft., perf. 3,101-3,295 ft., completed in upper zone of Pliocene age.

Standard Oil Co. 107 Baldwin, 2-2s-12w, pumped 124 bbl., 17.1-gravity, 40 per cent cut, T.D. 2,845 ft., perf. 2,513-2,845 ft., completed in Baldwin zone of Pliocene age.

Wilmington, Los Angeles County: Long Beach Oil Development Co. 52-W Harbor, 3-5s-13w, pumped 295 bbl., 18.5-gravity oil, 0.1 per cent cut, T.D. 3,440 ft., gravel packed perf. 3,152-3,435 ft., completed in Ranger zone of Pliocene age.

N. CENTRAL TEXAS

Record Flow Established by Burns-Ragland Mississippian Well

WICHITA FALLS, Tex.—L. T. Burns 1 C. H. Rogers, Sec. 290, T.E.L. Sur., in the Burns-Ragland pool, established a record flow for wells in North Texas producing from the Mississippi lime when it flowed 213.68 bbl. in 2 hours through ¾-in. choke from pay at 4,854-81 ft. to rate a daily potential of 3,364 bbl.

Archer County. — W. J. and J. J. Moran 1 Alvin Jentsch, Browning field, was shot with 150 qt. of nitro to stimulate production from Ellenburger lime topped at 5,204 ft. which produced only 20 bbl. oil on 20-hour swabbing test after acid treatment of 5,000 gal.

Jack County.—The new Ellis Caddo lime pool was given a north extension when Hanlon-Buchanan, Inc. 1 T. C. Jones was flowing by heads after acid treatment of 3,000 gal. in pay from 4,906 to 4,912 ft.

NORTH TEXAS COMPLETIONS

Wildcats

Wichita County: H. B. Dudley 1 T. R. Boone, 1,532 ft. from E, 1,500 ft. from S, Blk. 28, Southside Farm subd. of Palo Pinto School Land, dry, T.D. 1,350 ft.

Fields

Archer, Archer County: Danson Oil 16 Carenter, 765 ft. from S, 465 ft. from W, 40-ac. lease, Blk. 39, Clark & Plumb subd., pump 10 bbl., pay 1,065 ft., T.D. 1,073 ft.

Bindel, Cooke County: Texas 2 J. Fleitman, 660 ft. from N and E, William Simpson Sur., elev. 1,135 ft., flow 970 bbl. 35 grav., pay 3,193 ft., Ellenburger lime, T.D. 3,216 ft.

Burns-Ragland, Young County: L. T. Burns 1 C. H. Rogers, 495 ft. from S and W of N 50 ac. Sec. 290, T.E.&L. Sur., flow 3,364 bbl., ¾-in. choke, pay 4,850 ft., Mississippi lime, T.D. 4,881 ft.

Illinois Bend, Montague County: R. C. Lipscomb 2 W. F. Harmon Est., 330 ft. from N, 1,884 ft. from E, W. C. Winters Sur. A-842, dry, T.D. 3,962 ft.

Thornberry, Clay County: Akin & Dimock 10-A John Saner, 950 ft. from NW, 330 ft. from SE of Lot 32, but in Lot 33, G.C.&S.F. Sur. A-594, dry, T.D. 1,303 ft.

W. H. Spradling 1 J. P. Boddy, 330 ft. from N and W, S½ Blk. 46, Bacon subd., elev. 920 ft., dry, T.D. 1,342 ft.

Vogtsberger, Archer County: Fain & McGaha 1 Emma Thorman, 467 ft. from N and E of NW¼ Sec. 11, Blk. 1, H.&T.C. Sur., flowed 240 bbl., pay 4,633 ft., T.D. 4,690 ft.

WEST CENTRAL TEXAS

ABILENE, Tex. — J. D. Hancock 1 Black Brothers Ranch, Section 1144, T.E.&L. Survey, Stephens County, closely watched Ellenburger wildcat, cored Caddo lime showing oil from 3,252-67 ft., additional lime showing oil from 3,924-30 ft., topped Barnett shale at 4,293 ft., Mississippi lime at 4,368 ft. with slight show oil from 4,371-75 ft., and was drilling below 4,410 ft. still in the Mississippi.

Wildcats

Coleman County: T. S. Stanfield 1 E. W. Gill, 320-ac. tract, Elenor Mudd Sur., dry, T.D. 881 ft.

Fields

Admiral, Callahan County: Earl Johnson 1 Ace Hickman, S½ Lot 2, Sec. 31, Deaf & Dumb Asylum Lands, dry, T.D. 439 ft.

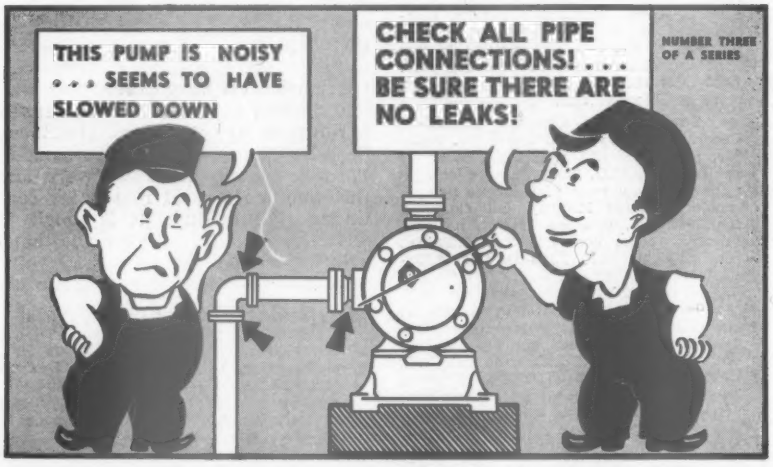
Echo, Coleman County: Anzac Oil Corp. 20-J J. P. Morris, 330 ft. from S and W Blk. 20, R. Rodriques Sur., Sec. 266, T.D. 2,585 ft.

Merkel, Taylor County: Stayton Oil 1 B. Morgan, SW SW Blk. 8, Lge. 124, Grimes County School Land, dry, T.D. 2,655 ft.

Putnam, Callahan County: Trumter Pet. 9 Slaughter, SW SE SW Sec. 7, Deaf & Dumb Asylum Lands, dry, T.D. 401 ft.

Shackelford, Shackelford County: W. S. Merrick and Jinks Ikard 1 Pittman & Reynolds, Sec. 541, T.E.&L. Sur., dry, T.D. 802 ft.

Caddo, Stephens County: O. J. Urban 1 Riddle heirs, SW SW NE Sec. 45, Blk. 6, T.&P.R.R. Sur., dry, T.D. 2,030 ft.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SOUTHWEST TEXAS

Shallow Discovery Reported In Karnes County

CORPUS CHRISTI, Tex.—Discovery of a shallow oil sand in Karnes County has given that area fresh importance and touched off an active demand for leases. Following the recent opening of the Hobson field by Seaboard Oil Co. 1 Julia Rzeppa, that company's west offset, the 1 R. F. Fertsch, is showing for another good producer. The Fertsch well, bottomed at 4,032 ft., tested 210 bbl. in 24 hours through 5/32-in. choke, with tubing pressure of 500 lb. and casing pressure of 725 lb. Perforations were at 4,021-24 ft. Initial production of the Rzeppa was 151 bbl. Transwestern Oil Co. 1 H. T. Sellers, Karnes County wildcat 6½ miles southeast of Runge, was at 6,200 ft. in shale without having uncovered important shows. Blanco Oil Co. and Al Buchanan 1 Clara Puckett Nichols, 4 miles south of Kenedy, was coring at 6,025 ft.

Starr County.— Nothing conclusive was reported from Ike Howeth's wildcat, 1 E. P. Caffarelli, 5 miles southeast of El Saug, which has given promise of being a pool opener. At total depth of 3,626 ft. the well swabbed salt water with a trace of oil. A squeeze job was done and at latest report the crew was waiting for cement to harden. Production is believed to be from the Cockfield. Ten strings are at work on wildcat operations in Starr County. Dee Davenport and Lockhart Oil Co. have staked location for a wildcat, 2 Domingo L. Garza, about 1½ miles southeast of the Caffarelli well and will move in as soon as the latter well is completed. Sun Oil Co. 1 D. Laurel, 2 miles west of the North Sun field, which showed indications of becoming a pool opener in early tests and which started an active leasing play last January, has gone into the dry and abandoned column at total depth of 8,542 ft. T. E. Stephens 1 Gonzales heirs, 10 miles north of Roma, revealed only a minor show of oil in a completion test at 4,495-4,520 ft., and it was decided to squeeze the sand and to perforate at 3,977-89 ft. The well, bottomed at 5,378 ft., showed oil, distillate, gas and mud while cleaning from the 4,500-ft. level, and it is regarded as a possible pool opener.

LOWER GULF COAST COMPLETIONS

Wildcats

Nueces County: Phillips 1 William Huermann, 5½ mi. E of Robstown, 6.38 bbl. distillate and 186,000 cu. ft. gas through ⅛-in. choke, T.P. 2,100 lb., C.P. 2,715 lb., gas-oil ratio 33,000, perf. 7,202-08 ft., T.D. 8,176 ft., discovery, Violet field.

Fields

Agua Dulce, Nueces County: Renwar Oil Corp. 4 J. B. Knight, Palo Alto grant, 190 bbl. through ⅛-in. choke, T.P. 1,100 lb., C.P. 1,225 lb., gas-oil ratio 600, perf. 7,164-69 ft., T.D. 7,196 ft.

Richards Petroleum Co. 3 Union Central Life Insurance Co., Palo Alto grant, 70 bbl. distillate and 21,000,000 cu. ft. gas, open flow, from perf. 3,836-46 ft., R.P. 2,470 lb., 125 bbl. distillate and 57,000,000 cu. ft. gas, open flow, from perf. 6,799-6,814 ft., R.P. 2,560 ft., T.D. 7,198 ft.

Gallagher, Jim Wells County: M. M. Miller & Son 1-B T. M. Gallagher, Casa Blanca grant, 162 bbl. through 5/32-in. choke, T.P. 650 lb., S.I. C.P. 1,425 lb., perf. 5,139-46 ft., T.D. 5,258 ft.

Odem, San Patricio County: Seaboard 6 O. T. Bomer, Juan Hart & Sons Sur. A-10, completed as S.I. gas well, no test taken, T.D. 6,806 ft.

Seeligson, Jim Wells County: Magnolia 40 A. A. Seeligson, Los Jaboncillos grant A-378, 280 bbl. daily through ¼-in. choke, T.P. 925 lb., S.I. C.P. 1,175 lb., T.D. 6,794 ft.

Sun 18 P. Canales, J. E. Stevens Sur. 364, 122 bbl. through 7.64-in. choke, T.P. 810 lb., C.P. 875 lb., gas-oil ratio 691, perf. 5,220-26 ft., T.D. 6,016 ft.

SOUTH TEXAS COMPLETIONS

Wildcats

Live Oak County: Continental 1 Albert W. West et al, 1½ mi. SE of Oakville, dry at 2,704 ft.

McMullen County: J. W. Gorman Drilling Co. 1 J. W. Atkinson, A.B.&M. Sur. 125, A-55 (core test), dry at 2,037 ft.

Starr County: Sun 1 Cortez, 5 mi. SE of Boule field, dry at 4,620 ft.

Sun 1 D. Laurel, 2 mi. W of North Sun field, dry at 8,542 ft.

Fields

Colorado, Jim Hogg County: Humble 10

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T. T. East, Las Moritas grant, 14.48 bbl. pumping, gas-oil ratio 220, T.D. 3,225 ft.

Driscoll, Duval County: Continental 14-B Clara Driscoll, U. Lott Sur. 848, A-900, 303 bbl. through ¼-in. choke, T.P. 215 lb., C.P. 650 lb., gas-oil ratio 151, perf. 2,882-92 ft., T.D. 3,906 ft., P.B. 3,130 ft.

East Jim Hogg County: Sun 2-D T. T. East, Santo Domingo de Arriba grant, 175 bbl. through 3/16-in. choke, T.P. 450 lb., C.P. 1,200 lb., gas-oil ratio 625, T.D. 4,731 ft.

South White Creek, Live Oak County: Joe Stelzig et al 2 J. W. Hoelscher, B.S.&F. Sur. 15, 33 bbl. pumping, perf. 1,841-45 ft. and 1,835-40 ft., T.D. 1,848 ft.

Yturria, Starr County: Sun 1-B Garcia Land & Livestock Co., Por. 100, dry at 4,329 ft.

SOUTH CENTRAL TEXAS COMPLETIONS

Fields

Imogene, Atascosa County: Humble 1 Duren & Richter, Peter McGreal Sur. 1292, dry at 9,390 ft.

MICHIGAN

Good Completion Reported In Aetna Field

SAGINAW, Mich. — Productivity of Missaukee County's Aetna Township field was increased by 700 bbl. a day last week as Gordon Oil Co. 1 Kornoely in Section 26 was completed at 3,839 ft. That was the week's principal development in Michigan oil fields as operators reported a total of 12 completions, eight of which were dry holes, several wildcat test failures among them. Sun Oil Co. reported 205 bbl. a day flow from its 1 Halstead in Section 28 of Osceola Township, Osceola County, and two 50-bbl. producers were completed in the Bangor - Van Buren pool, but salt water appeared in both.

MICHIGAN COMPLETIONS

Grand Traverse County, Grant Township: Peter J. Bolger 1 Weber, N½ SE SE 11-25n-12w, wildcat, dry, T.D. 2,379 ft.

Missaukee County, Aetna Township: Gordon Oil Co. et al 1 Kornoely, S½ NE SW 26-22n-6w, 700 bbl. natural, T.D. 3,839 ft.

Pure Oil Co. 1 Jenema, C S½ SE SE Sec. 27, dry, T.D. 3,874 ft.

Enterprise Township: Pure Oil Co. 1 Nix, C S½ NW NW 11-23n-5w, dry, T.D. 3,284½ ft.

Oceana County, Greenwood Township: Muskegon Development Co. 1 State of Michigan, C NW SW 27-13n-15w, wildcat test, dry, T.D. 2,757 ft.

Osceola County, Osceola Township: Sun Oil Co. 1 Lauman, C N½ SE SE 21-18n-8w, dry, T.D. 3,830 ft.

Sun Oil Co. 1 Halstead, C N½ NE SE Sec. 28, flowing 205 bbl., acidized, T.D. 3,732 ft.

Roscommon County, Roscommon Township: Mogul Oil Co. C-1 State, C S½ SE NE 34-21n-3w, dry, T.D. 3,462 ft.

Van Buren County, Bangor Township: Andrew S. Hoyt, agent, 3 Shugars, SW NW SW 21-2s-16w, pumping 50 bbl. and salt water, acidized, T.D. 1,004 ft.

Harris Oil Co. 1 Piefer, SW NW SW Sec 9, pumping 50 bbl. and salt water, acidized, T.D. 1,028 ft.

N. R. Dodd 1 Pifer, SW NW NW Sec. 10, dry, T.D. 1,060 ft.

Geneva Township: T. C. Hudson 1 Neundorf, SW NW NE 25-1s-16w, wildcat test, dry, T.D. 1,098½ ft.

ROCKY MOUNTAIN AREA

Largest Lease Play in Recent Years Now Under Way

DENVER, Colo.—The extent of the lease play now under way in the Rocky Mountain area far exceeds anything which has taken place in recent years and is on a much greater scale than appears on the surface. Heretofore certain districts embracing one-third to one-half of a state have about indicated the activity at any one time, but now the area is spread out to take in entire groups of states. Leasing is under way from the Canadian border to northwestern New Mexico and northeastern Arizona, a distance north and south of approximately 1,000 miles, and from eastern Utah to western Nebraska, an east-west distance of 500 miles. This does not mean that all of these states as a whole are being combed for leases, but the most attractive areas in them.

Oil companies domiciled in this territory have been doubling and trebling their land and geological staffs in recent months in anticipation of the big play getting under way, but the more significant factor is that California and Mid-Continent companies which formerly investigated this territory are returning, and others who heretofore have not been active are coming in. A check made this week by one of the majors shows that 14 seismograph crews are scheduled to go into the field this spring. The Carter Oil Co., which recently entered this area, is particularly active in Montana and is reported to have 15 lease men working out of Shelby. The Phillips Petroleum Co. is reported preparing to open offices in Denver, and other companies not yet ready to reveal their plans have representatives here.

Some of the high spots revealed recently were the leasing up of two structures in Apache County, Northeast Arizona, by the Midwest and Argo companies; the blocking up of 200,000 acres in Dawes County, western Nebraska, by one company in a district where Sinclair already has a block; the leasing up of several structures in eastern Utah, particularly Grand County, by the Minnelusa Oil Corp., and others; a play already under way just south of the Colorado line in northwestern Oklahoma; and the taking of thousands of acres just south of the Canadian line in northern Montana by Carter, Texas and other companies. These about outline the outer rim of the territory involved and do not include the activity within the circle.

The Montana State Land Board sold leases on March 23 on 72 tracts embracing 26,085 acres in which the Carter and Texas companies were the principal bidders. These filled in blocks east and west of the Kevin-Sunburst field, around Cut Bank and in the Dupuyer district in Pondera County. Prior to that sale another took place in which 16 tracts were sold, and another is scheduled for this month. One Carter block is south of the Texas block in the Dupuyer area in Pondera County, where the Texas Co. drilled a test last year on a block of 68,000 acres looking for a shore-line extension of Cut Bank. Other Carter blocks are located in the Big Wall, Ingomar and Gage districts in Yellowstone and

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Musselshell counties. The activity extends on south through Wyoming into Colorado where the Powder River, Denver and other large basins are under the eyes of the scouts.

Crude diversions.—Telegrams were received the past week by a number of Montana and Wyoming refiners from PAW directing them to divert certain shipments of crude from their plants to refiners in areas where it is much needed for war purposes. The figures involve 1,380 bbl. daily to Canada from Montana refiners and 5,000 bbl. from Wyoming, and 1,150 bbl. from Montana to the Inland Empire refinery at Spokane, Wash. The diversions to Spokane include 310 bbl. from the Home Oil & Refining Co., 450 bbl. from the Glacier Production Co., and 390 bbl. from the Texas Co. Diversions to Canada include 235 bbl. daily by Big West Oil Co., 625 bbl. by the Northwest Refining Co. and 520 bbl. by the Texas Co. The Wyoming diversions are from refineries in the Big Horn basin. This action resulted from studies by the Distribution and Supply Division of PAW which have been under way since last December. It is stated that it is temporary and was made in an effort to take care of Canada and the Pacific Northwest in the emergency.

Fremont County, Wyoming.—British-American Oil Producing Co. 1 Tribal, NE NW NW 5-3n-1w, a discovery in the Sundance on the Steamboat Butte structure north of the Pilot Butte field, did not flow when agitated, but swabbed 60 bbl. an hour at the start of a 24-hour test and averaged 27 bbl. an hour for the period. The well, which is strictly a wildcat, was headed for the Tensleep when it encountered the oil. Total depth is 5,119 ft., the top of the Sundance, 5,081 ft., with the 7-in. at 5,091 ft. Upon completion of testing it will be decided whether to continue on down to the Tensleep. The oil tests 30 gravity.

Kevin-Sunburst.—Imperial-Craig 8 Martin, NE SE SE 18-35n-1w, which had a hole full of oil in the contact at 1,602 ft., a completion last week, did not flow when agitated but pumped 120 bbl. before pumping off. It is drilling deeper in search of a break in the lime.

The WPA order authorizing 10-acre locations for the development program for Kevin-Sunburst field has run into a snag. It provided that not more than four wells could be drilled on a forty; that locations must be back 330 ft. from the lease line; and at least 500 ft. from any other well. The problem arises where a well already has been drilled in the center of the forty, which makes the designated footage impossible. Fred C. Platt, oil and gas supervisor, wired Michael J. Foley, director of production for District 4, at Denver, asking whether exception would have to be obtained to drill the corner locations. Mr. Foley replied in the affirmative.

Wilson Creek.—With the recent completion of 12 Unit in Wilson Creek by the Texas Co. and California Co., the present drilling program has been completed and rig moved away. Of 12 wells drilled 11 are producers, the only dry hole being at the north end. The field is operated as a single unit and was developed by a series of wells out on the flanks around the dome to conserve pressure on top for obtaining maximum production. Most of the wells are equipped so that when desired they may be deepened from the Morrison into the Sundance sand. A dozen or more locations remain to be drilled when conditions warrant. Future drilling program soon will be decided.

MONTANA COMPLETIONS

Cut Bank, Glacier County: Santa Rita Oil & Gas Co. 1 Weaver, SE NE SW 27-35n-6w, T.D. 2,931 ft., 7-in. 2,906 ft., no Sunburst sand, Cut Bank 2,881-2,930 ft., main pay 2,919-30 ft., swabbed 88 bbl., then shot.

Kevin-Sunburst, Toole County: O. Nepstad 4 Haugen, C NW NE 11-35n-3w, T.D. 1,859 ft., break in Madison at 1,850-57 ft., pumped 250 bbl. second 22 hr.

Prevol & Shay 3 Government, NW NE NE 15-35n-3w, dry at 2,113 ft., acid, contact 1,720 ft., water 2,105-10 ft.

Texas Co. 17 Bruin, SW SW SW 15-35n-2w, T.D. 1,595 ft., contact 1,587 ft., acid, pumped 63 bbl.

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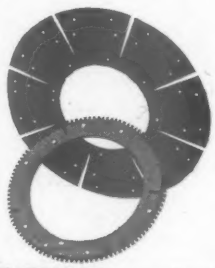

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OKLAHOMA

Wildcat Has Oil on Drill-Stem Test

A NEW Wilcox sand pool was in prospect for Pottawatomie County the early part of the week at Hall-Briscoe 1 Dieker, SW SW 19-9n-2e. Sandy dolomite was found at 6,165 ft. and the second Wilcox at 6,174 ft. A core at 6,177-82 ft. recovered 3 ft. of stained sand and a drill-stem test at 6,176-82 ft. made 120 ft. of oil and 15 ft. of drilling water. The well was then shut down for orders. Location is approximately 5 miles south and west of the new Lake Shawnee pool and 6 miles southwest of Centerpoint.

Garvin County.—Crews were still working to bring Ohio Oil Co.'s 1 Burns under control after it blew out with an estimated 25,000,000 to 50,000,000 cu. ft. of gas a day in a Pennsylvanian sand at 2,876-88 ft. The well is some 8 miles southeast of Pauls Valley in SE NE SW 17-3n-2e.

OKLAHOMA COMPLETIONS

Wildcats

Creek County, Mannford district: Las Tecas et al 1-H Jackson, SW SW SE 9-18n-9e, pumped 7 bbl. oil and 5 water, sand 3,091 ft., T.D. 3,124 ft.

Garvin County: Garr-McCracken 1 Hart, NW SW SW 25-1n-3w, dry, T.D. 2,193 ft., Hunton 1,575 ft., Viola 2,103 ft.

Greer County, 3 mi. NW of Blake: Noble and Stanolind 1 Herron, NW NW 11-4n-24w, dry, T.D. 5,305 ft., Panhandle lime 2,360 ft., Pontotoc 2,417 ft., Arbuckle 5,235 ft., drill-stem test 5,273-5,305 ft. recovered 3,000 ft. of salt water in 40 min.

Okfuskee County: British-American 1 Admire, SW NW SW 24-12n-9e, dry, T.D. 3,906 ft., Cromwell 3,186 ft., Hunton 3,671 ft., Viola 3,800 ft., Wilcox 3,852 ft., second Wilcox 3,865 ft.

Pittsburg County: Phillips 1 Bowlby, NE NW NE 4-5n-12e, dry, T.D. 6,508 ft., Hartshorne Coal 3,340 ft., sand 3,350 ft., Cromwell 6,229 ft., could not lower water below 1,500 ft.

Pottawatomie County: Deep Rock et al 1 Baker, NW NE SE 24-10n-2e, dry, T.D. 5,855 ft., Oswego 4,780 ft., Earlsboro 4,986 ft., Hunton 5,455 ft., Viola 5,615 ft., Wilcox 5,744 ft., second Wilcox 5,837 ft.

Seminole County, Hazel district: W. A. Villines 1-A Harris, SW SW SW 30-7n-6e, dry, T.D. 1,300 ft.

Stephens County: Simpson-Fell 1 Creel, SE NE SW 5-1s-5w, dry, T.D. 1,705 ft., top Pennsylvanian 1,280 ft.

Fields

Cement, Caddo County: Watchorn Oil & Gas 1 Ko-se-sa-nah, SW NE 26-6n-10w, dry, T.D. 6,144 ft.

Cumberland, Marshall County: Pure 4 Little-109, SE NW NW 20-5s-7e, flowed 156 bbl. in 4 hr., sand 5,953 ft., T.D. 6,046 ft.

Cushing, Creek County: Sinclair Prairie 7 Billey, SE NW SE 28-18n-7e, flowed 180 bbl., Bartlesville 2,585-2,649 ft.

Sinclair Prairie 19 Tucker, NE SE NW 10-17n-7e, pumped 5 bbl., Bartlesville 2,789-2,817 ft.

Sinclair Prairie 23 West, SE NW SW 16-17n-7e, pumped 5 bbl., sand 2,700-65 ft., T.D. 2,779 ft.

Doyle, Stephens County: Clark-Cowden 12 Lena Simpson, SW NE 11-1n-5w, flowed 102 bbl. through choke, sand 6,142-74 ft., T.D. 6,189 ft.

Garber, Garfield County: Sinclair Prairie 24 Campbell, C S½ N½ 30-22n-3w, pumped 60 bbl., sand 1,470-89 ft., T.D. 1,492 ft.

Glenn Pool, Creek County: Sinclair Prairie 46 Berryhill, NE NW 16-17n-12e, pumped 2 bbl., T.D. 1,556 ft.

Gulf 38 Pittman, SE NW SW 8-17n-12e, repressure well, T.D. 1,574 ft.

Sinclair Prairie 42 Berryhill, SE NW NW 16-17n-12e, repressure well, T.D. 1,563 ft.

Sinclair Prairie 43 Berryhill, S½ NW NW 16-17n-12e, pumped 20 bbl., sand 1,400-1,568 ft., T.D. 1,575 ft.

Sinclair Prairie 44 Berryhill, S½ NE NW 16-17n-12e, pumped 4 bbl., T.D. 1,552 ft.

Sinclair Prairie 45 Berryhill, NW NW 16-17n-12e, pumped 10 bbl., T.D. 1,590 ft.

Oklahoma City, Oklahoma County: Continental 1 Donly, SW NE SW 22-12n-3w, pumped 251 bbl., Wilcox 6,440-6,539 ft.

Pottawatomie County: Atlantic et al 1 Quinlan, NW NE NW 19-11n-5e, flowed 334 bbl. in 15 hr., Wilcox 4,778-82 ft.

Seminole County: Blackwell 3 Fleet-Osborne, SW SE NE 12-8n-6e, dry, T.D. 3,794 ft., drill-stem test 3,784-94 ft. recovered salt water, Viola 3,490 ft., Hunton 3,330 ft.

Vanderslice, Creek County: Burke-Greis et al 1 Gibson, NE NE NW 31-14n-7e, 4,000,000 cu. ft. gas, Prue 2,845-78 ft., T.D. 2,914 ft.

Weaver, Pottawatomie County: Sinclair Prairie 1 Atwater, NW NW NW 33-8n-3e, flowed 375 bbl., Hunton 4,661-78 ft.

Wilzetta E, Lincoln County: Amerada et al 2 Holik, SE NE NW 10-12n-5e, pumped 100 bbl., Red Fork 3,803-18 ft., T.D. 3,850 ft.

Miscellaneous

Creek County: L. B. Jackson 1 Noble, NE NW 3-19n-8e, dry, T.D. 3,215 ft.

Lincoln County: Mid-Continent 1 Little, SE SW 29-17n-5e, 660,000 cu. ft. gas, Skinner sand 3,480-90 ft., T.D. 3,675 ft.

McIntosh County: Phillips 1 Ruby, NW SW 30-10n-16e, dry, T.D. 4,972 ft., Hunton 4,207 ft., Viola 4,375 ft., Wilcox 4,435 ft.

Pawnee County: Sinclair Prairie 44 Jones, N½ NW 20-21n-8e, dry, T.D. 2,418 ft.

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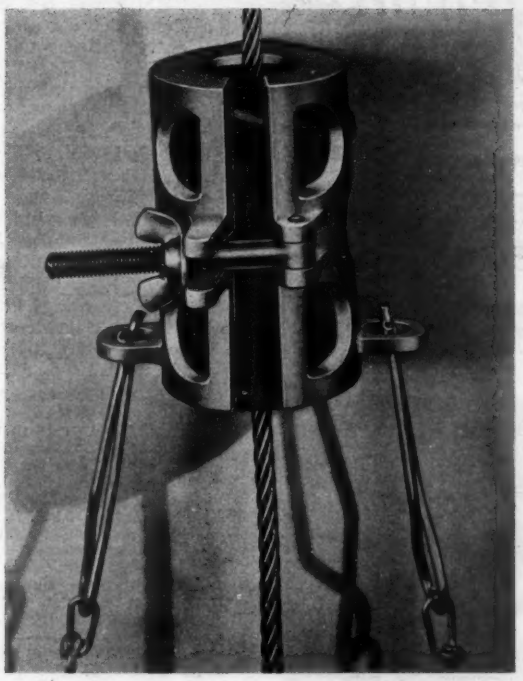

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ILLINOIS

Small McClosky Well Opens New Edwards County Pool

MATTOON, Ill.—A McClosky lime pool was opened in 16-1s-9e, Edwards County, but the discovery well produced only 39 bbl. on the pump after it was twice acidized.

New work kept pace with completions during the week and seven wildcat operations were started including M. V. Duncan 1 Wirth, NE SW NW 23-2s-14w, Edwards County, moving in material; R. W. Slemaker 1 Ackerman, NW NW NE 21-5s-10e, White County, location; W. C. McBride, Inc., 1 Bayley, C SW SE 3-7s-9e, White County, location; Ohio Oil Co. 1 U. S. Coal & Coke, NE NE NW 13-6s-3e, Franklin County, location; J. W. Menhall 1 Kirkpedrick, SW SE SE 35-5s-1e, Jefferson County, moving in material; Central Illinois Oil Co. 1 Zimmerman, SW SW SW 36-11n-2w, spudded and shut down; Kingwood Oil Co. 1 Massic, C SW SW 12-9n-8e, Cumberland County.

Nash-Redwine 1 Prudential Insurance Co., NE NE 34-3s-3e, King pool, Jefferson County, was reported to have swabbed 1,040 bbl. in 24 hours from Aux Vases sand at 2,721-48 ft.

Gulf Refining Co. 2 Sneed, C NW NE 20-4s-7e, Blairsville field, Hamilton County, flowed 1,175 bbl., total depth 3,427 ft. Same company's 2 A. Lockwood, NW SW SE 16-5s-5e, was dry at 3,415 ft.

ILLINOIS COMPLETIONS

Wildcats

Clark County: W. H. Wright 1 Finney, C NW NE 32-9n-14w, dry at 395 ft.

Edwards County, discovery well: Nelson Development Co. 1 Reed, SE SW NW 16-1s-10e, pumped 39 bbl., McClosky lime topped at 3,326 ft. on electrical survey showed oil at 3,328½-32 ft., acidized with 500 gal. and 2,000 gal., T.D. 3,388 ft.

Franklin County: Oil Management, Inc., 1 U. S. Coal & Coke, NE NW NW 25-5s-2e, dry at 2,920 ft., Glen Dean deep 2,198-2,223 ft., Cypress 2,943 ft., Paint Creek 2,604-15 ft., Benoist 2,627 ft., Renault 2,669-87 ft., Aux Vases 2,687 ft., small show of oil, Ste. Genevieve 2,747 ft., Fredonia 2,836 ft., McClosky 2,853-61 ft.

Hamilton County: Texas Co. 1 J. Mann, SE NW NE 21-6s-6e, dry at 3,375 ft., 1-hr. D.S. test at 3,240 ft., developed 30 ft. of mud.

Richland County: Hassler et al 1 Bunn-Community, E½ SE NW 33-3n-14w, dry at 3,182 ft., Glen Dean at 2,568-88 ft., Golconda 2,656 ft., Barlow 2,735-52 ft., Weiler 2,822-72 ft., Paint Creek 2,888 ft., Renault 2,964 ft., Ste. Genevieve 2,974 ft., McClosky 3,115-18 ft., 3,125-27 ft., and 3,135-44 ft.

St. Clair County: Jacob Vetsch 1 Mary Lange, SE cor. NW 24-2s-6w, dry at 2,745 ft., Chattanooga 1,985 ft., Devonian 2,087 ft., Trenton 2,632 ft.

Eason Oil 1 Thomas, NE cor. NW 4-1s-8w, dry at 2,174 ft., Cypress top 195 ft., St. Louis 432 ft., Trenton 1,632 ft., St. Peter 2,157-74 ft.

Warren County: King & Heiser 2 McGrew, NW NW NE 31-8n-1w, (4th p.m.), dry at 810 ft., Ste. Genevieve 220 ft., Niagara 640 ft.; Maquoketa 742 ft.

Wawne County: Lambert & Peek 1 Byron-Dobbs, C SW NW 15-1n-9e, dry at 3,401 ft., upper Glen Dean 2,670 ft., lower Glen Dean 2,678-2,700 ft., Cypress 2,912-19 ft., Weiler 2,943-85 ft. and 2,996-3,050 ft., Benoist 3,090-3,102 ft., Aux Vases 3,190 ft., Ste. Genevieve 3,246 ft., Rosiclare 3,260 ft., Fredonia 3,309 ft., McClosky 3,344-45 ft., with small show of oil.

White County: B. M. Heath 1 Miller, SE NE SW 26-4s-9e, dry at 3,359 ft., upper Kincaid 2,027 ft., Benoist 3,047 ft., lower Renault 3,167 ft., Aux Vases 3,173-3,212 ft., Ste. Genevieve 3,237 ft., McClosky 3,267-71 ft., D.S. test in McClosky developed a show of oil, gas and water.

Fields

Bible Grove, Clay County: Texas 1 Bloemker-Webster, NW NW SW 3-5n-7e, pumped 94 bbl., Cypress sand at 2,486-96 ft., T.D. 2,534 ft.

Blairsville, Hamilton County: Gulf 2 Sneed, NW NE 20-4s-7e, flowed 1,175 bbl. (no water), combination well, Aux Vases at 3,243-83 ft. and McClosky acidized at 3,411-18 ft., T.D. 3,427 ft.

Clay City, Wayne County: Pure Oil 2 Flexter, SE NW SE 35-2n-7e, pumped 216 bbl., Aux Vases sand top at 2,926 ft., shot 2,930-47 ft.

Pure Oil 2 Riggs Consolidated, NW NE SW 33-2s-7e, pumped 116 bbl., Aux Vases sand top at 2,936 ft., oil at 2,952-55 ft. and 2,958-61 ft., T.D. 3,072 ft.

Cole, Wayne County: W. C. McBride 1 Newton, NW NE NE 30-1s-5e, dry at 3,010 ft., Cypress 2,620 ft., Benoist 2,824 ft., Aux Vases 2,880 ft., Ste. Genevieve 2,942 ft., Fredonia 2,990 ft.

Dale-Hoodville, Hamilton County: Kingwood 9 Dodd, NW NE NW 6-6s-7e, dry at 3,056 ft., Weiler at 2,694-2,730 ft., had oil show.

Texas-Gulf 2 Henderson-Johnson, SE SW SE 11-6s-6e, pumped 52 bbl., Aux Vases saturated sand 3,076-90 ft., shot at 3,085-3,180 ft.

Dupo, St. Clair County: Thompson et al 1 Nolte, dry at 1,866 ft.

Flora, Clay County: National Refining 1 Thing, C W½ NW NW 24-3n-6e, 36 bbl., McClosky 2,980-90 ft., acid.

Noble, Richland County: Pure 37 J. O. Coen, CNL 9-3n-9e, 114 bbl. oil, 37 bbl. water, Weiler 2,593-2,620 ft., T.D. 2,650 ft., perf. at 2,568-97 ft.

Iola, Clay County: Tide Water 7 C. B. Davis, SW SE NE 15-5n-5e, 107 bbl. oil, 5 bbl. water, Benoist sand, shot, at 2,291-2,301 ft., Aux Vases shot with 20 qt. at 2,336-50 ft.

Central Pipe Line 3 Reed heirs, SE NW NW 14-5n-5e, pumped 75 bbl., Cypress sand 2,136-48 ft.

Louden, Fayette County: Carter 3 Smith, NW SE NE 30-8n-3e, pumped 89 bbl., Cypress 1,473 ft., Weiler 1,510 ft., T.D. 1,556 ft.

Mayberry, Wayne County: Texas 1 Murphy-Draper, C N½ NW NE 8-3s-6e, dry at 3,437 ft., upper Glen Dean 2,675-2,705 ft., Aux Vases 3,232-68 ft., Ste. Genevieve 3,292-3,304 ft., Rosiclare 3,316 ft., Fredonia 3,350 ft., McClosky 3,355-3,400 ft., St. Louis 3,434 ft., T.D. 3,434 ft.

Texas 1 Boswell, NW SW NE 8-3s-6e, abandoned 150 ft.

New Harmony, White County: Cal-Star Petroleum Co. 38-C Miller-Ford, pumped 45 bbl., shot at 2,840-55 ft., Aux Vases top at 2,836 ft.

Mabee Oil & Gas Co. 12 O. Smith, NW SW SW 4-4s-14w, pumped 32 bbl., Aux Vases at 2,801-24 ft., 50-qt. shot at 2,809-13 ft.

Sun Oil Co. 7 Hossler-Spencer, NE NE NW 6-5s-11e, pumped 250 bbl., 30-qt. at 2,331-49 ft. and 2,330-55 ft., T.D. 2,356 ft.

Phillipstown, White County: N. V. Duncan 1 Stokes, northwest extension test, SE NE SE 27-4s-10e, dry at 3,212 ft., Kincaid 1,887-1,910 ft., lower Kincaid 2,003-25 ft., Benoist 2,854 ft., lower Renault 2,979-98 ft., Aux Vases 3,010 ft., Ste. Genevieve 3,028 ft., Fredonia 3,052 ft.,

McClosky 3,125-30 ft., and 3,134-41 ft. water, St. Louis 3,207 ft.

North Aden, Wayne County: Texas 1 R. Lyons, NE SW SW 33-2s-7e, old 400-bbl. well P.B. from 3,327 ft. to 3,262 ft., pumped 270 bbl. from Aux Vases sand, perf. with 57 holes at 3,188-3,211 ft.

North Boos, Jasper County: Pure 2 Reach, C NW NE 20-6n-10e, dry 2,855 ft.

Rural Hill, Hamilton County: Oil Carriers 1 T. A. Warren, NE SE SE 26-6s-5e, flowed 281 bbl., Aux Vases sand, shot at 3,099-3,118 ft.

Russellville, Lawrence County: S. T. Olin et al 6 Scott-Gray, 810 ft. from S and 130 ft. from E line SW 18-4n-10w, 5,866,000 cu. ft. gas at 784-805 ft.

Sailor Springs, Clay County: E. B. Gill 1 Keck, SE NW NE 35-4n-7e, pumped 150 bbl., Tar Springs sand 2,315-20 ft., 40-qt. shot at 2,320-28 ft., T.D. 2,328 ft.

Salem, Marion County: Texas 2 Blenz, NW NW SE 16-1n-2e, pumped 26 bbl., Benoist sand 1,910-16 ft.

S.E. Clay City, Wayne County: Pure 1 Brinker, C SE NW 14-1n-8e, pumped 156 bbl. oil and 6 bbl. water in 21 hours, McClosky 3,079-87 ft., acid., T.D. 3,090 ft.

South Stokes, White County: Carter 1 Phillips, NW NE NE 19-6s-9e, pumped 167 bbl., shot in Cypress sand at 2,651-56 ft. and 15-qt. in Benoist at 2,794-2,810 ft.

Walpole, Hamilton County: Texas 3 F. R. Wilson, SE SW SW 27-6s-6e, pumped 355 ft., Aux Vases sand 3,108-18 ft., shot.

Texas 4 Hall, SE SW NW 27-6s-6e, pumped 112 bbl., Aux Vases 3,082-3,109 ft., shot.

Perrine & Pearson 2 Lee, SE NW NW 27-6s-6e, pumped 355 bbl., Aux Vases at 3,082-96 ft., shot.

OHIO, INDIANA

Wellington Gas Field Is Extended to West

ZANESVILLE, Ohio.—The Wellington pool in Lorain County was extended a location to the west by the completion of the Abbott well in Lot 1, Wellington Township. The well gaged 3,950,000 cu. ft. and rocked up to 1,150 lb. A fair producer was completed in the Clayton pool on an inside location. The Sinclair Prairie is drilling in the Trenton limestone on the Longsworth test in Olive Township, Meigs County. The top of the Trenton was found at 7,000 ft. and the company expects to drill through this formation.

OHIO COMPLETIONS

Athens County, Ames Township: Carpenter & Glazier 2 F. E. Phillips, Fr. 7, Cow Run, dry, T.D. 197 ft.

Trimble Township: Preston Oil 222 Sunday Creek Coal Co., Sec. 36, Clinton, dry, T.D. 3,627 ft.

York Township: F. J. O'Mara 2 Alonzo Coakley, Sec. 30, Berea, dry, T.D. 850 ft.

Fairfield County, Pleasant Township: City Nat. Gas 1 William B. McCandlish, Sec. 25, Clinton, 143,040 cu. ft., T.D. 2,532 ft.

Lorain County, Wellington Township: Glen Harmon 1 Fred Abbott, Lot 1, Clinton, 3,950,000 cu. ft., T.D. 2,407 ft.

Medina County, Hinckley Township: Wiser Oil 1 John Neiding, Lot 28, Clinton, 261,000 cu. ft., T.D. 3,392 ft.

Ohio Fuel 1 F. S. Damon, Lot 33, Clinton, 1,420,000 cu. ft., T.D. 3,418 ft.

Morgan County, York Township: Ohio Fuel 1 M. M. Dovenbarger, Sec. 26, Clinton, dry, T.D. 4,359 ft.

Perry County, Clayton Township: Preston Oil 2 Mary A. Yarger, Sec. 5, Clinton, 105 bbl., T.D. 3,383 ft.

Reading Township: Industrial Gas 2 Ida Dittoe, Sec. 21, Berea, 300,000 cu. ft., T.D. 922 ft.

Industrial Gas 1 W. A. Baker, Sec. 3, Clinton, dry, T.D. 3,010 ft.

Washington County, Barlow Township: Thornley et al 10 Thomas E. Barrett, Sec. 25, Vincent, dry, T.D. 525 ft.

Wayne County, Plain Township: Ohio Fuel 1 William Kuhn, Sec. 31, Clinton, 235,000 cu. ft., T.D. 3,083 ft.

Ohio Fuel 1 Dewey Prost, Sec. 31, Clinton, dry, T.D. 3,029 ft.

INDIANA

EVANSVILLE, Ind.—Knightstown Natural Gas Co. made a location for a wildcat, 2 Mason, NE cor. SE NE SE 31-16n-9e, in Henry County.

In Posey County Lelalu Oil Co. 1 Dickhant, NW SW NE 19-6s-12w, in the Caborn pool, drilled to 2,755 ft. in a test for McClosky lime. No information as to results was available. C. A. Baldwin 1-A Reichart, NE NW SE 25-7s-15w, was shut down for orders at 2,198 ft.

INDIANA COMPLETIONS

Hazelton, Knox County: J. E. Bauer and Sinclair, no farm name, SW NW SW 11-2n-11w, 105 bbl. oil and 5 bbl. water, Barlow 1,569-85 ft., St. Louis 1,793 ft., McClosky lime oil shows at 1,815-20 ft. and 1,859-63 ft., 2,000 gal. acid at 1,805-67 ft., flowed 105 bbl. oil and 5 bbl. water in 24 hours.

Jay County: W. L. Hartley 1 fee, CEL NE 36-24n-12e, T.D. 1,023 ft., pumped 1½ bbl. per day.

Spencer County: Ira Huff et al 1 Huser, NW NW NE 31-6s-5w, junked and abandoned at 1,255 ft., no McClosky logged.

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NORTH LOUISIANA

Claiborne Parish Has New Travis Peak Well

SHREVEPORT, La.—The opening of one new Travis Peak pool in Claiborne Parish and the possibility of new Pettit lime pool in Caddo Parish ended an active week in this area. Three miles southeast of Sugar Creek, Hunt Oil 1 W. J. Byrd, SE NW 17-19n-5w, was said to have flowed 28 bbl. of oil an hour, through choke, after perforations at 5,579-88 ft. in the Travis Peak zone.

Owens & Harris 1 Fuller, a wildcat located about 2 miles southwest of the town of Mira and north of the Hosston pool of Caddo Parish, was swabbing low-gravity oil but production tests had not been completed. Perforations were made in the Pettit lime zone around 5,800 ft. with 160 shots, followed by an acid treatment.

NORTH LOUISIANA COMPLETIONS

Wildcat, Red River Parish: Haynes & Ownby Drlg. 1 Sample, NW SE 3-14n-11w, dry, T.D. 6,010 ft.

Lake St. John, Tensas Parish: The Calif. Co. 2 State Lease 476, 13-9n-10e, dry, T.D. 4,650 ft.

Little Creek, La Salle Parish: Fred W. Henslee 1 Miles, NE NE 36-9n-1e, 43 bbl., Wilcox 2,461-65 ft., T.D. 2,503 ft.

ARKANSAS COMPLETIONS

Wildcats

Cleveland County: Talco Asphalt 1 McGree, NE SE 27-10s-11w, dry, T.D. 3,745 ft.

Ouachita County, N of Stephens: Vaughn et al 1 Reynolds-Berg, SE SW 6-15s-19w, dry, T.D. 6,017 ft.

Mount Holly, Union County: Atlantic Ref. 1-C Davis, NE SW 10-17s-18w, flowed 121 bbl., Smackover 7,189-91 ft., T.D. 7,240 ft.

New London, Union County: Marine Oil 1 Wooley, SW SW SW 7-18s-11w, flowed 190 bbl., perf. 5,672-88 ft., T.D. 5,840 ft.

MISSISSIPPI

JACKSON, Miss.—California Co.'s wildcat test in Lincoln County, the 1 G. T. Smith, 4-7n-7e, squeezed off all perforations between 12,128 and 12,245 ft. and as the week closed was preparing to perforate and make a drill-stem test. Total depth is 12,229 ft. Pure Oil Co. 1 J. M. McDowell, 1-6n-4w, was at 11,102 ft. and preparing to make a drill-stem test. Humble Oil & Refining 1-B L. N. Dantzler Lumber Co., 20-5s-8w, was drilling ahead at 5,365 ft. in shale.

CANADIAN FIELDS

Large Spring Drilling Program Anticipated

CHATHAM, Ont.—No detailed information is being made public as to the extensive oil development being undertaken this spring in the Northwest Territories. Last year considerable drilling was done in the immediate area of the Fort Norman field on the Mackenzie, and actual and potential production there was materially increased. This year's operations will be carried farther afield, with a view to opening oil areas convenient to the Alaska Highway. The technical aspects will be in charge of Imperial Oil through its subsidiary, the Northwest Co., which handled the Fort Norman development. Other United States companies may ultimately be associated with the operations, or may handle certain areas under development. The companies interested have ample equipment and no difficulties as to priorities will be involved.

In addition to the Mackenzie Basin, attention will probably be given to the northern foothills areas of the Rocky Mountains. These areas, through northern Alberta, British Columbia and the Yukon, are entirely untested, except in the Peace River-Pouce Coupe district, where a few inconclusive wells have been drilled.

Government-assisted oil projects in the north also include the further investigation and development of the tar-sand area of the Athabaska, where, last year, more economical methods of processing and especially mining the sands were studied. Utilization of the tar sands for hard-surfacing the Alaska Highway is one of the projects under consideration.

Turner Valley.—In the northwest portion of the North Turner Valley Extension, Northclonmel Royalties 1, LSD 16, 7-21-3w5, finished at 8,850 ft. with Madison limestone at 8,459 ft., had an initial production of 186 bbl. daily from the upper zone of the lime. This is the most westerly producer yet completed in the North Extension, being ¾ mile west of Northwest-Hudson's Bay 11.

Devonian Test in Madison.—In the north end of the west central area, Devonian Test 1, LSD 2, 25-19-3w5, which is being drilled as a joint test of the underlying Devonian limestone by a group of Turner Valley companies, has got the Madison limestone at 7,250 ft. and is deepening in that formation below 7,263 ft. An additional 450 ft. of drilling is expected to make the test through the two productive zones of the Madison to the black lime horizon, but the depth required to reach the Devonian lime is uncertain, though a total depth of 10,000 ft. may be required to test Devonian production.

Ontario Operations.—In the southwest Ontario fields, a recent summary shows 11 completions, of which eight were producers with aggregate initial production of 1,211,500 cu. ft. daily. The most important completion was Union Gas 119, Lot 12, Concession 4, Zone Township, finished at 1,650 ft. with 974,500 cu. ft. daily. Location was approximately 6 miles south of the nearest producers in the Euphemia, or eastern, end of the Dawn field; and a considerable distance east of the Chatham Township field. A producer at this point indicates fair possibilities of either an extension of one or other of these fields or a new producing area, as this is the first gas production encountered at depth in Zone Township. The well is somewhat north and west of the Bothwell shallow oil field.

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CRUDE PRICES

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24-24.9	...	...	...	...	.93	.87	...
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25-25.9	.95	$.95	...	.88	.95	.90	...
26-26.9	.97	.97	...	.90	.97	.93	...
27-27.9	.99	.99	...	.92	.99	.96	...
28-28.9	1.01	1.01	$1.01	.94	1.01	.99	...
29-29.9	1.03	1.03	1.03	.96	1.03	1.02	...
30-30.9	1.05	1.05	1.05	.98	1.05	1.05	$1.05
31-31.9	1.07	1.07	1.07	1.00	1.07	1.07	1.07
32-32.9	1.09	1.09	1.09	1.02	1.09	1.09	1.09
33-33.9	1.11	1.11	1.11	1.04	1.11	1.11	1.11
34-34.9	1.13	1.13	1.13	1.06	1.13	1.13	1.13
35-35.9	1.15	1.15	1.15	1.08	1.15	1.15	1.15
36-36.9	1.17	1.17	1.17	1.10	1.17	1.17	1.17
37-37.9	1.19	1.19	1.19	1.12	1.19	1.19	1.19
38-38.9	1.21	1.21	1.21	1.14	1.21	1.21	1.21
39-39.9	1.23	1.23	1.23	1.16	1.23	1.23	1.23
40 and above	1.25	1.25	1.25	1.18	1.25	1.25	1.25

OKLAHOMA AND KANSAS TABLE EXPLANATION

Column 1 Mid-Continent grades:
Pure Oil Co., 5-20-41.
Gulf Oil Corp., 5-20-41.
Skelly Oil Co. (Kansas only), 5-19-41.
H. F. Wilcox Oil & Gas Co., 5-20-41.

Column 2 Mid-Continent grades:
White Eagle Oil Purchasing Co., Inc., 5-19-41, Kansas only.
Sinclair Prairie Oil Marketing Co., 5-20-41.

Column 3 Mid-Continent grades:
Continental Oil Co., 5-19-41.
Phillips Petroleum Co., 5-19-41.
Tide Water Associated Oil Co., 5-20-41.

Column 4 Jackson and Tillman counties:
Gulf Oil Corp., 5-20-41.

Column 5 Mid-Continent grades:
Standard Oil Co. (Indiana), 5-20-41.
National Refining Co., 5-20-41.

Column 6 Mid-Continent grades:
Magnolia Petroleum Co., 5-21-41.
Shell Oil Co., Inc., 5-19-41.
Shell, in Carter County, 12-5-41.
Ben Franklin Refining Co., 12-4-41.
Carter Oil Co. (Oklahoma only), 5-19-41.

Column 7 Oklahoma:
Champlin Refining Co., 5-20-41.

OKLAHOMA FLAT PRICE

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Pure Oil Co., 9-4-41.	

LOUISIANA AND SOUTHERN ARKANSAS TABLE EXPLANATION

Standard Oil Co. of Louisiana, 5-22-41.
Column 1 applies to Atlanta, Buckner, Magnolia, Schuler (Jones sand), Village, and Lewisville fields.
Column 2 applies to De Soto, Sabine, Fouke, Homer, Miller County, Sugar Creek, and Nebo.
Column 3 applies to Little Creek, Olla, and South Olla (4-3-43).
Column 4 applies to Bayou Mallet, Choctaw, Darrow, Jeanerette, Lirette, North Crowley, South Crowley, Port Barre, Potash, Roanoke, St. Martinville, and Port Allen.
Column 5 applies to University (Baton Rouge). Posted 6-2-42.
Column 6 applies to Cotton Valley crude, Rodessa and Shreveport (Cross Lake); also Anse La Butte, effective 8-1-41, starting at 80 cents for below 21°, also to Caddo effective 10-15-41.
Continental Oil Co., 5-21-41.
Column 7 applies to Abbeville, Louisiana.
Stanolind Oil & Gas Co., 5-21-41.
Column 8 applies to East and West Hackberry.
Column 9 applies to Caddo Parish, effective 10-15-41.
Column 9 applies to Evangeline, Acadia Parish.
Lion Oil Refining Co., 5-22.41.
Column 1 applies to Reynolds lime, Jones sand, Schuler, Ark.
Column 2 applies to El Dorado, West and South Rainbow fields, Snow Hill, and Schuler-Morgan sand.
Placid Oil Co., 5-22-41.
Column 3 applies to Olla.
Column 2 applies to Nebo field.
Shell Oil Co., Inc., 5-20-41.
Column 10 applies to Roanoke, Chalkley.
Column 11 applies to Iowa, Black Bayou, White Castle.
Column 12 applies to Gibson, South Houma, Hester, West Lake Verret.
Magnolia Petroleum Co., 5-21-41.
Column 13 applies to Lockport, Cameron Meadows, and West Gueydan, La.
Column 6 applies to Haynesville, Cotton Valley, Rodessa, La., and Miller County, Arkansas.
Phillips Petroleum Co., 3-29-41.
Arkansas Fuel Oil Co., 2-19-42.
Column 1, Schuler (Jones sand), except schedule starts at 76 cents for below 25° gravity.
Gulf Refining Co., 5-21-41.
Column 9, Jennings.
Column 8, Edgerly, Starks, Vinton, East Hackberry, Cameron Meadows, and Leesville.
Column 16 applies to Grand Bay, Quarantine Bay, Timbalier Bay, and West Bay, except schedule starts at $1.12 for below 28° gravity.
Column 6 applies to Caddo, Homer, Bull Bayou, Crichton, De Soto, Haynesville, and El Dorado.
Column 4 applies to West Gueydan, effective 5-25-42.
Pure Oil Co., 4-22-41.
Column 14 applies to Gueydan crude.
Column 6, Caddo, Homer, Haynesville, Bull Bayou, Crichton, De Soto, and El Dorado.
Texas Co., 5-21-41.
Column 6 applies to North Louisiana.
Columns 15 and **16,** Bay St. Elaine, Caillou Island, Iberia, Lake Barre, Lake Pelto, Leesville, Port Barre. (Schedules A and B).
Column 17, Bateman Lake, Dog Lake, Fausse Point, Horseshoe Bayou, Jefferson Island, Plumb Bob, Vermilion Bay, West Cote Blanche, and Delta Duck Club.
Column 18, Delta Farm, Lake Salvador, Golden Meadow.

LOUISIANA AND ARKANSAS FLAT PRICES

Continental Oil Co., 5-21-41:	
Tepetate and Lake Arthur	$1.18
Ville Platte	1.20
Gulf Refining Co., 5-21-41:	
Smackover (Ark.)	$0.83
Lion Oil Refining Co., 5-22-41:	
Smackover (heavy)	.83
Dorcheat	1.15
Phillips Petroleum Co., 5-22-41:	
Smackover (heavy)	$0.83
Placid Oil Co., 5-22-41:	
Tullos-Urania (5-21-41)	$1.15
Cotton Valley dist. (above 60°)	1.30
Cotton Valley (Holloway sand)	1.25
Cotton Valley (Bodcaw-D sands)	1.20
Pure Oil Co.:	
Bosco (5-21-41)	$1.14
Sweet Lake (5-22-41)	1.06
Creole (5-22-41)	1.16
Republic Oil Co., 6-2-41:	
Nevada County, Arkansas	$0.80
Republic Oil Refining Co., 5-21-41:	
Bayou Pigeon	$1.20
Shell Oil Co., Inc., 5-20-41:	
Happytown	$1.15
Standard Oil Co. of Louisiana, 5-22-41:	
Big Creek, Dorcheat, McKamie, Columbia, Macedonia (sour) (2-3-43)	$1.25
Smackover (heavy)	.83
Cotton Valley distillate (9-1-41)	1.40
Cotton Valley (Holloway sand)	1.25

LOUISIANA AND SOUTHERN ARKANSAS GRAVITY TABLE

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Below 18	...	...	...	...	...	...	...	...	...	...	...	...	$.94	...	...	...	...	...
18-18.9	...	...	...	...	...	...	...	...	...	...	...	...	.96	...	...	...	...	...
19-19.9	...	...	...	...	...	...	...	...	...	...	...	...	.98	...	...	...	...	...
Below 20	...	...	...	...	...	...	...	$1.06	...	$.94	$.99	$.89	...	...	$1.06	...	...	...
20-20.9	...	...	...	...	...	...	...	1.08	...	.96	1.01	.91	1.00	...	1.08	...	...	...
Below 21	$.68	...	...	$.90	...	...	...	...	...	...	...	...	...	$.90	...	...	...	...
21-21.9	.70	...	...	.92	...	...	...	1.10	...	.98	1.03	.93	1.02	.92	1.10	...	...	...
22-22.9	.72	...	...	.94	...	...	...	1.12	...	1.00	1.05	.95	1.05	.94	1.12	...	...	...
23-23.9	.74	...	...	.97	...	...	...	1.14	...	1.02	1.07	.97	1.08	.96	1.14	...	...	...
24-24.9	.76	...	...	.98	...	...	...	1.16	...	1.04	1.09	.99	1.11	.98	1.16	...	...	...
Below 25	...	$.86	$1.03	...	...	$.88	...	...	...	...	...	...	...	...	...	...	...	...
25-25.9	.78	.88	1.05	1.00	...	.90	...	1.18	...	1.06	1.11	1.01	1.14	1.00	1.18	...	...	...
26-26.9	.80	.90	1.07	1.02	...	.92	...	1.20	...	1.08	1.13	1.03	1.17	1.02	1.20	...	...	...
27-27.9	.82	.92	1.09	1.04	...	.94	...	1.22	...	1.10	1.15	1.05	1.19	1.04	1.22	...	...	...
28-28.9	.84	.94	1.11	1.06	...	.96	...	1.24	...	1.12	1.17	1.07	1.21	1.06	...	$1.14	$1.06	...
29-29.9	.86	.96	1.13	1.08	...	.98	...	1.26	...	1.14	1.19	1.09	1.23	1.08	...	1.16	1.08	...
30-30.9	.88	.98	1.15	1.10	$1.28	1.00	...	1.28	...	1.16	1.21	1.11	1.25	1.10	...	1.18	1.10	$1.05
31-31.9	.90	1.00	1.17	1.12	1.30	1.02	...	1.30	$1.07	1.18	1.23	1.13	1.27	1.12	...	1.20	1.12	1.07
32-32.9	.92	1.02	1.19	1.14	1.32	1.04	...	1.32	1.09	1.20	1.25	1.15	1.29	1.14	...	1.22	1.14	1.09
33-33.9	.94	1.04	1.21	1.16	1.34	1.06	...	1.34	1.11	1.22	1.27	1.17	1.31	1.16	...	1.24	1.16	1.11
34-34.9	.96	1.06	1.23	1.18	1.36	1.08	...	1.36	1.13	1.24	1.29	1.19	1.33	1.18	...	1.26	1.18	1.13
35-35.9	.98	1.08	1.25	1.20	1.38	1.10	...	...	1.15	...	...	...	...	1.20	...	1.28	1.20	1.15
Below 36	...	...	...	...	...	...	$1.07	...	...	...	...	...	...	...	...	...	...	...
36-36.9	1.00	1.10	1.27	1.22	1.40	1.12	1.09	...	1.17	...	...	...	...	1.22	...	1.30	1.22	1.17
37-37.9	1.02	1.12	1.29	1.24	1.42	1.14	1.11	...	1.19	...	...	...	...	...	...	...	...	1.19
38-38.9	1.04	1.14	1.31	1.26	1.44	1.16	1.13	...	1.21	...	...	...	...	...	...	...	...	1.21
39-39.9	1.06	1.16	1.33	1.28	1.46	1.18	1.15	...	1.23	...	...	...	...	...	...	...	...	1.23
40 and above	1.08	1.18	1.35	1.30	1.48	1.20	1.17	...	1.25	...	...	...	...	...	...	...	...	1.25

Lisbon distillate	$1.20
Texas Co., 5-21-41:	
Erath	$1.21
Garden Island	1.36
Lafitte, Paradis	1.19
Lake Mongoulois	1.36

CANADIAN FIELDS

Imperial Oil, Ltd.:	
Petrolia, 11-6-39	$2.10
Oil Springs, 11-6-39	2.07
Bothwell, 11-6-39	2.10
Turner Valley, 7-16-41	$1.35-1.97

SOUTH TEXAS AND SOUTHWEST TEXAS GRAVITY TABLES

	1	2	3	4	5	6	7
Below 20	$1.03	$1.08	$1.08	$.89	$1.03	$1.03	$1.08
20-20.9	1.05	1.10	1.10	.90	1.05	1.05	1.10
21-21.9	1.07	1.12	1.12	.91	1.07	1.07	1.12
22-22.9	1.09	1.14	1.14	.92	1.09	1.09	1.14
23-23.9	1.11	1.16	1.16	.93	1.11	1.11	1.16
24-24.9	1.13	1.18	1.18	.94	1.13	1.13	1.18
25-25.9	1.15	1.20	1.20	.95	1.15	1.15	1.20
26-26.9	1.17	1.22	1.22	.96	1.17	1.17	1.22
27-27.9	1.19	1.24	1.24	.97	....	1.19	1.24
28-28.9	1.21	1.26	1.26	.98	....	1.21	1.26
29-29.9	1.23	1.28	....	.99	....	....	1.28
30-30.9	1.25	1.30	....	1.00	....	....	1.30
31-31.9	1.27	1.32	....	1.01	....	....	1.32
32-32.9	1.29	1.34	....	1.02	....	....	1.34
33-33.9	1.31	1.36	....	1.03	....	....	1.36
34-34.9	1.33	1.38	....	1.04	....	....	1.38
35-35.9	1.35	1.40	....	1.05	....	....	1.40
36-36.9	1.37	1.42	....	1.06	....	....	....
37-37.9	1.39	1.44	....	1.07	....	....	....
38-38.9	1.41	1.46	....	1.08	....	....	....
39-39.9	1.43	1.48	....	1.09	....	....	....
40 and above	1.45	1.50	....	1.10	....	....	....

SOUTH TEXAS AND SOUTHWEST TEXAS TABLE EXPLANATION

Column 1 Mirando:
Humble Oil & Refining Co., 5-21-41, includes Blanchard, Bridwell, Colorado, Comitas, Eagle Hill, Escobas, Fitzsimmons, Glen, Government Wells (North and South), Heyser, Hoffman, Kelsey, Kohler, Loma Novia, Lundell, Manila, Mirando Valley, Placedo, Randado, Sarnosa, and Tesoro.
Magnolia Petroleum Co., 5-21-41.
Continental Oil Co., 7-1-41, includes Hoffman, Government Wells (North and South), Lopez, Moco, Colmena, Seven Sisters, South Seven Sisters, Loma Novia, Conoco, Driscoll, O'Hern, Piedra Lumbre, and Taranchauas.
American Mineral Spirits Co., 5-21-41, includes Adami and Munson.
Republic Oil Refining Co., 5-21-41, includes Heyser field crude.

Column 2 Refugio:
Continental Oil Co., 7-1-41, includes Minnie Bock, Clara Driscoll, South Clara Driscoll, Driscoll Ranch, Orange Grove and Wade City.
Humble Oil & Refining Co., 5-21-41, includes East White Point, Greta, Melon Creek, O'Connor-McFaddin, Plymouth Saxet, Taft, and Tom O'Connor.
American Mineral Spirits Co., 5-21-41, includes Plymouth, Taft, and East White Point.

Column 3 Refugio:
Texas Co., 5-21-41, includes Greta, Saxet, and Taft.

Column 4 La Rosa:
American Mineral Spirits Co., 3-29-41.

Column 5 Duval-Mirando:
Sun Oil Co., 5-21-41.

Column 6 Duval-Mirando:
Texas Co., 5-21-41.

Column 7 Nueces County:
American Mineral Spirits Co., 5-21-41.
Republic Oil Refining Co., 5-21-41.

NORTH TEXAS, WEST CENTRAL TEXAS, EAST CENTRAL TEXAS GRAVITY TABLES

	1	2	3	4	5	6	7	8
Below 20	....	....	....	....	$0.86	....	....	....
20-20.9	....	....	....	....	.82	....	....	....
Below 21	....	....	....	....	....	$0.81	....	....
21-21.9	....	....	....	....	.84	.83	....	....
22-22.9	....	....	....	....	.86	.85	....	....
23-23.9	....	....	....	....	.88	.87	....	....
24-24.9	....	....	....	....	.90	.89	....	....
Below 25	....	....	$0.88	....	....	....	$0.89	$0.95
25-25.9	$0.91	....	.90	$0.97	.92	.91	.91	.97
26-26.9	.93	....	.92	.99	....	.93	.93	.99
27-27.9	.95	....	.94	1.01	....	.95	.95	1.01
28-28.9	.97	$0.97	.96	1.03	....	.97	.97	1.03
29-29.9	.99	.99	.98	1.05	....	.99	.99	1.05
30-30.9	1.01	1.01	1.00	1.07	....	1.01	1.01	1.07
31-31.9	1.03	1.03	1.02	1.09	....	1.03	1.03	1.09
32-32.9	1.05	1.05	1.04	1.11	....	1.05	1.05	1.11
33-33.9	1.07	1.07	1.06	1.13	....	1.07	1.07	1.13
34-34.9	1.09	1.09	1.08	1.15	....	1.09	1.09	1.15
35-35.9	1.11	1.11	1.10	1.17	....	1.11	1.11	1.17
36-36.9	1.13	1.13	1.12	1.19	....	1.13	1.13	1.19
37-37.9	1.15	1.15	1.14	1.21	....	1.15	1.15	1.21
38-38.9	1.17	1.17	1.16	1.23	....	1.17	1.17	1.23
39-39.9	1.19	1.19	1.18	1.25	....	1.19	1.19	1.25
40 and above	1.21	1.21	1.20	1.27	....	1.21	1.21	1.27

NORTH TEXAS, WEST CENTRAL TEXAS, EAST CENTRAL TEXAS TABLE EXPLANATION

Column 1 West Central and North:
Humble Oil & Refining Co., 12-11-41, includes Brown, Callahan, Comanche, Eastland, Fisher, Haskell, Jones, Shackelford, Stephens, and Throckmorton counties.
Panhandle Refining Co., 12-11-41, in Leuders area.
Gulf Refining Co., 12-11-41.
Sinclair Prairie Oil Marketing Co., 12-11-41.

Column 2 North Texas:
Continental Oil Co., 12-11-41.
Magnolia Petroleum Co., 12-11-41.
Panhandle Refining Co., 12-11-41.
Bell Oil & Gas Co., 12-11-41.
Texas Co., 12-11-41.

Column 3 East Central:
Magnolia Petroleum Co., 5-21-41, includes Cass, Panola, and Rodessa (Texas and Louisiana), and Miller County, Arkansas.
Gulf Refining Co., 5-21-41, includes Rodessa, Texas.

Column 4 East Central:
Humble Oil & Refining Co., 5-21-41, includes Anderson, Cherokee, Limestone, and Navarro counties and the Navarro Crossing field.

Column 5 East Central:
Humble Oil & Refining Co., 5-21-41, includes Hawkins field.

Column 6 North Texas:
Stanolind Oil Purchasing Co., 12-11-41.

Column 7 Fisher County:
Shell Oil Co., Inc., 12-11-41.

Column 8 Mexia:
Sinclair Prairie Oil Marketing Co., 5-30-41.

TEXAS FLAT-PRICE FIELDS

Agua Dulce (light), Benavides, Longhorn, Southland, and Sweden, 5-21-41	$1.35
Agua Dulce (heavy), 10-16-41	$1.25
Republic Oil Refining Co., 5-21-41.	
Alfred and Magnolia City	$1.35
Continental Oil Co., 5-21-41.	
Alice, Benavides (North Sweden), Ben Bolt, Clark-Muil, Sun, and Tom Graham	$1.38
Humble Oil & Refining Co., 5-21-41.	
Batson (new), Humble (35° and above), Fig Ridge, Hardin, Hull (35° and above), La Belle, North Dayton (25° and above), Seabreeze South China, West Orange, Willow Slough and Oyster Bayou	$1.38
Sun Oil Co., 5-21-41.	
Cass County	$1.39
Texas Co., 5-21-41.	
Cayuga, Anderson County	$0.90
Pan American Production Co., 5-21-41.	
Chapel Hill, Smith County:	
Crude distillate	$1.30
Crude oil	1.18
Chapel Hill Gas System, 11-7-41.	
Clay Creek, Washington County	$1.00
Sun Oil Co., 5-21-41.	
Cleveland, Liberty County	$1.36
Magnolia Petroleum Co., 5-21-41.	
Conroe, Montgomery County	$1.43
Humble Oil & Refining Co., 5-21-41.	
Tide Water Associated Oil Co., 5-21-41.	
Sun Oil Co., 5-21-41.	
Texas Co., 5-21-41.	
Cotton Lake (South)	$1.35
Sun Oil Co., 5-21-41:	
East Texas and Flag Lake*	$1.25
*Humble Oil & Refining Co., 5-21-41.	
Pan American Production Co., 5-21-41.	
Tide Water Associated Oil Co., 5-21-41.	
Gulf Refining Co., 5-21-41.	
Magnolia Petroleum Co., 5-21-41.	
Sinclair Prairie Oil Marketing, 5-21-41.	
Shell Oil Co., Inc., 5-20-41.	
Sun Oil Co., 5-21-41.	
Texas Co., 5-21-41.	
Stanolind Oil Purchasing Co.	
Esperson (35° and above), South Esperson	$1.30
Sun Oil Co., 5-21-41.	
Flour Bluff, East Flour Bluff	$1.33
Humble Oil & Refining Co., 5-21-41.	
Hockley and Cochran	$0.87
Texas Co., 5-21-41.	
Livingston and Mercy	$1.25
Shell Oil Co., Inc., 5-20-41.	
Long Lake	$1.23
Sinclair Prairie Oil Marketing, 5-21-41.	
Luby	$1.35
American Mineral Spirits Co., 5-21-41.	
Luling	$1.06
Magnolia Petroleum Co., 5-21-41.	
Lytton Springs	$1.17
Magnolia Petroleum Co., 5-21-41.	
Salt Flat, North Salt Flat, Darst Creek*, Hilbig, Clark, Carroll, and Zoborski	$1.41
Humble Oil & Refining Co., 5-21-41.	
Magnolia Petroleum Co., 5-21-41.	
*Texas Co., 5-21-41.	
Rincon (North), Sun, North Sun and Garcia	$1.35
Sun Oil Co., 5-21-41.	
Yturria	$1.45
Sun Oil Co., 3-19-42.	
Talco	$0.79
Humble Oil & Refining Co., 5-21-41.	
Magnolia Petroleum Co., 5-21-41.	
Tomball and Satsuma	$1.40
Humble Oil & Refining Co., 5-21-41.	
*Magnolia Petroleum Co., 5-21-41.	
Stanolind Oil Purchasing Co., 4-1-41.	
Van, Van Zandt County	$1.06
Humble Oil & Refining Co., 5-21-41.	
Pure Oil Co., 5-21-41.	
Yates (regular)	$0.95
Humble Oil & Refining Co., 5-21-41.	
Gulf Refining Co., 5-21-41.	
Shell Oil Co., Inc., 5-20-41.	
Yates (shallow)	$0.82
Shell Oil Co., Inc., 5-20-41.	

TEXAS GULF COAST GRAVITY TABLES

	(1)	(2)	(3)	(4)	(5)
Below 20	$1.06	$1.06	....	$0.98	$0.93
20-20.9	1.08	1.08	....	1.00	.95
Below 21	....	....	$1.08	....	....
21-21.9	1.10	1.10	1.10	1.02	.97
22-22.9	1.12	1.12	1.12	1.04	.99
23-23.9	1.14	1.14	1.14	1.06	1.01
24-24.9	1.16	1.16	1.16	1.08	1.03
25-25.9	1.18	1.18	1.18	1.10	1.05
26-26.9	1.20	1.20	1.20	1.12	1.07
27-27.9	1.22	1.22	1.22	1.14	1.09
28-28.9	1.24	1.24	1.24	1.16	1.11
29-29.9	1.26	1.26	1.26	1.18	1.13
30-30.9	1.28	1.28	1.28	1.20	1.15
31-31.9	1.30	1.30	1.30	1.22	1.17
32-32.9	1.32	1.32	1.32	1.24	1.19
33-33.9	1.34	1.34	1.34	1.26	1.21
34-34.9	1.36	1.36	1.36	1.28	1.23
35-35.9	1.38	....	1.38	1.30	1.25
36-36.9	1.40	....	1.40	1.32	1.27
37-37.9	1.42	....	1.42	1.34	1.29
38-38.9	1.44	....	1.44	1.36	1.31
39-39.9	1.46	....	1.46	1.38	1.33
40 and above	1.48	....	1.48	1.40	1.35

TEXAS GULF COAST GRAVITY TABLE EXPLANATION

Column 1:
Humble Oil & Refining Co., 5-21-41, in-

cludes Amelia, Clear Lake, Goose Creek, Hastings, Magnet, Mykawa (new), Raccoon Bend, South Thompson, Sugarland, Thompson, and Webster fields.

Stanolind Oil & Gas Co., 5-21-41, includes West Beaumont, High Island, and Spindletop.

Sinclair Prairie Oil Marketing Co., 5-21-41.

Stanolind Oil Purchasing Co., 4-9-42, includes Clinton and Lake Creek.

Pure Oil Co., 4-21-41, includes Louise and Ganado.

Gulf Refining Co., 5-21-41, includes Spindletop, Sour Lake, Lovells Lake, West Beaumont, Goose Creek, South Liberty, Big Creek, Blue Ridge, Fannett, Moore, Barbers Hill, Hankamer, Thompson, Lochridge, Dyersdale, and Hull (old).

Sun Oil Co., 5-21-41, includes Barbers Hill, Batson (old), Bayou Blue, Chacahoula, Cotton Lake, Esperson (below 35° gravity), Fausse Point, Goose Creek, Greens Lake, Hackberry (east and west), Hull (below 25°), Humble (below 35°), Nome, North Dayton (below 25°), Orange, Saratoga, Sour Lake, South Liberty, and Vinton.

Column 2:

Texas Co., 5-21-41, includes Arriola, Ganado, Hamman, Hillje, Humble, Kubela, Magnet, Manvel, Markham, Mauritz, Old Ocean, Pickett Ridge, Port Neches, Sour Lake, West Columbia, and Withers.

Column 3:

Pan American Production Co., 5-21-41, includes Hastings and South Houston.

Stanolind Oil & Gas Co., 4-1-41, includes High Island, Spindletop, Hastings, and South Houston.

Column 4:

Humble Oil & Refining Co., 5-21-41, includes Anahuac, Angleton, Cedar Point, Fishers' Reef, Hull (new and old), Pierce Junction, Red Fish Reef, and Turtle Bay.

Gulf Refining Co., 5-21-41, includes Anahuac, Hull (new), Thompson (deep), Pierce Junction, and Orange.

Sun Oil Co., 5-21-41, includes Anahuac, Caplen and Turtle Bay.

Humble Oil & Refining Co., 3-29-41, includes Dickinson, Gillock, Hardin, League City, and Rowan.

Column 5:

Pan American Production Co., 5-21-41, includes Gillock, except scale starts at 95 cents below 21°.

Stanolind Oil Purchasing Co., 5-21-41, includes Fairbanks, North Houston, and Roslyn.

Continental Oil Co., 7-9-41.

Phillips Petroleum Co., 7-9-41.

Column 5 Winkler and Lea:

Stanolind Oil & Gas Co., 5-21-41, includes Winkler County only.

Gulf Refining Co., 5-21-41, includes Lea County, New Mexico, only.

Column 6 Gray County:

Texas Co., 5-21-41.

H. F. Wilcox Oil & Gas Co., 7-9-41.

Column 7 Lea County:

Magnolia Petroleum Co., 5-21-41.

Column 8 Eddy County:

Continental Oil Co., 5-30-41.

Column 9:

Shell Oil Co., Inc., 5-20-41, includes Crane, Ector, Howard, Glasscock, Upton, Winkler, and Yoakum counties, Texas, and Lea County, New Mexico.

Column 10 Texas Panhandle:

Humble Oil & Refining Co., 7-9-41.

Column 11 Panhandle:

Sinclair Prairie Oil Marketing Co., 5-23-11.

WEST TEXAS, PANHANDLE, AND NEW MEXICO GRAVITY TABLES

	1	2	3	4	5	6	7	8	9	10	11
Below 20	$0.70	....	....	....	....	....	....	....	$0.70	$0.73	....
20-20.9	.72	....	....	....	....	....	....	....	.72	.75	....
21-21.9	.74	....	....	....	....	....	....	....	.74	.77	....
22-22.9	.76	....	....	....	....	....	....	....	.76	.79	....
23-23.9	.78	....	$0.78	....	....	....	....	....	.78	.81	....
24-24.9	.80	....	.80	....	....	....	....	....	.80	.83	....
Below 25	....	$0.80	....	....	....	....	$0.80	....	....	....	$0.83
25-25.9	.82	.82	.82	....	$0.82	....	.82	....	.82	.85	.85
26-26.9	.84	.84	.84	....	.84	....	.84	....	.84	.87	.87
27-27.9	.86	.86	.86	....	.86	....	.86	....	.86	.89	.89
28-28.9	.88	.88	.88	$0.91	.88	....	.88	$0.88	.88	.91	.91
29-29.9	.90	.90	.90	.93	.90	....	90	.90	.90	.93	.93
30-30.9	.92	.92	.92	.92	.92	....	.92	.92	.92	.95	.95
31-31.9	.94	.94	.94	.97	.94	....	.94	.94	.94	.97	.97
32-32.9	.96	.96	.96	.99	.96	....	.96	.96	.96	.99	.99
33-33.9	.98	.98	.98	1.01	.98	....	.98	.98	.98	1.01	1.01
34-34.9	1.00	1.00	1.00	1.03	1.00	$1.03	1.00	1.00	1.00	1.03	1.03
35-35.9	1.02	1.02	1.02	1.05	1.02	1.05	1.02	1.02	1.02	1.05	1.05
36-36.9	1.04	1.04	1.04	1.07	1.04	1.07	1.04	1.04	1.04	1.07	1.07
37-37.9	1.06	1.06	....	1.09	1.06	1.09	....	1.06	....	1.09	1.09
38-38.9	1.08	1.08	....	1.11	1.08	1.11	....	1.08	....	1.11	1.11
39-39.9	1.10	1.10	....	1.13	1.10	1.13	....	1.10	....	1.13	1.13
40 and above	1.12	1.12	....	1.15	1.12	1.15	....	1.12	....	1.15	1.15

WEST TEXAS, PANHANDLE AND NEW MEXICO TABLE EXPLANATION

Column 1:

Humble Oil & Refining Co., 5-21-41, includes Andrews, Crane, Crockett, Ector, Gaines, Glasscock, Howard, Reagan, Upton, Winkler, and Yoakum counties, West Texas, and Lea County, New Mexico.

Gulf Refining Co., 5-21-41, includes Crane, Ector, Upton, Ward, and Winkler counties, West Texas.

Column 2:

Sinclair Prairie Oil Marketing Co., 5-21-41, includes West Texas and Lea County, New Mexico. Effective 5-29-41, in Eddy County, New Mexico.

Magnolia Petroleum Co., 5-21-41, includes Upton, Howard, Glasscock, Mitchell, Winkler, Cochran, Hockley, Yoakum and Gaines counties.

Column 3:

Texas Co., 5-21-41, includes Crane and Winkler counties, Texas, and Lea County, New Mexico.

Column 4 Texas Panhandle:

Magnolia Petroleum Co.. 7-9-41.

EASTERN STATES

Pennsylvania and Ohio

South Penn Oil Co.:
- National lines, 3-26-42 ..... $3.00
- Southwest Penn, 3-26-42 ..... 2.65
- Eureka lines, 3-26-42 ..... 2.59
- Corning grade, 5-27-41 ..... 1.31

Tide Water Associated Oil Co.:
- Bradford, 3-26-42 ..... $3.00
- Allegany, N. Y., 3-26-42 ..... 3.00

Pennzoil Co.:
- Group A, 3-26-42 ..... $2.93
- Group B, 3-26-42 ..... 2.92
- Group C, 3-26-42 ..... 2.91
- Group D, 3-26-42 ..... 2.90
- Group E, 3-26-42 ..... 2.88

Quaker State Oil Refining Corp.:
- In Buckeye lines, 3-26-42 ..... $2.55
- In Eureka lines, 3-26-42 ..... 2.59

Kentucky

Ashland Oil & Transportation Co., 6-19-41:
- Big Sandy River $1.38
- Kentucky River 1.43

Sohio Corp., 5-21-41:
- Birk City $1.32

West Virginia

Pure Oil Co.:
- Cabin and Kelly Creek, 3-27-42 ..... $2.59

MIDDLE WEST FLAT PRICES

Illinois and Indiana

Ohio Oil Co.:
- Illinois basin, 5-21-41 ..... $1.37
- Eastern Illinois, 5-21-41 ..... $1.32
- Western Indiana, 5-21-41 ..... 1.22

Magnolia Petroleum Co.:
- Illinois basin, 5-21-41 ..... $1.37

Carter Oil Co.:
- Illinois (Louden), 5-21-41 ..... $1.37

Sohio Corp.:
- Illinois basin, 5-21-41 ..... $1.37

Texas Co.:
- Illinois basin, 5-21-41 ..... $1.37

(Continued on Page 143)

STANDARD OIL CO. OF CALIFORNIA CRUDE-OIL PRICES EFFECTIVE APRIL 1, 1943

(All gravities above those quoted take highest price offered in that field)

Gravity	Signal Hill (Long Beach)	Wilmington	Seal Beach	Huntington Beach	Inglewood	Olinda-Brea Canyon	Torrance	Richfield	Whittier East Coyote (La Habra)	Montebello	West Coyote Hills	Santa Fe Springs	Greeley, Canal, Wasco	Coles Levee	Mountain View	Elk Hills, Buena Vista Hills Midway-Sunset, Lakeview area	Coalinga	Kettleman Hills	Elwood Terrace
14-14.9	....	$0.93	....	$0.96	....	$0.95	$0.95	$0.95	$0.95	$0.97	....	....	....	....	....	$0.96	$0.98	....	....
15-15.9	....	.96	....	1.00	$1.01	.97	.97	.96	.97	.97	....	....	....	....	....	.98	.98	....	....
16-16.9	....	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	....	.98	.98	....	....
17-17.9	....	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	....	.98	.98	....	....
18-18.9	$0.93	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	....	.98	.98	....	....
19-19.9	.93	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	$0.98	.98	.98	....	....
20-20.9	.93	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	.98	.98	.98	....	....
21-21.9	.93	.96	....	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	.98	.98	.98	....	....
22-22.9	.96	.98	$0.86	1.00	1.01	.97	.97	.96	.97	.97	....	....	....	....	.98	.98	.98	....	....
23-23.9	1.00	1.02	.92	1.02	1.01	.98	.97	.98	1.00	.97	....	....	....	....	.98	.99	.98	....	....
24-24.9	1.03	1.06	.97	1.05	1.04	1.01	1.01	1.02	1.03	.97	$0.99	....	....	....	.98	1.03	.98	....	....
25-25.9	1.07	1.09	1.01	1.08	1.07	1.04	1.05	1.06	1.07	.98	1.02	....	....	....	.98	1.07	.98	....	....
26-26.9	1.11	1.12	1.06	1.11	1.10	1.08	1.09	1.10	1.11	1.01	1.06	....	....	....	.98	1.11	.98	....	....
27-27.9	1.15	1.15	1.10	1.14	1.14	1.11	1.13	....	1.15	1.05	1.10	$1.04	....	....	1.01	1.15	.98	....	....
28-28.9	1.18	1.18	1.15	1.17	1.17	1.14	1.17	....	....	1.08	1.13	1.06	....	....	1.04	1.19	1.00	....	....
29-29.9	1.20	1.21	1.19	1.20	1.20	....	....	....	....	1.12	1.17	1.12	....	....	1.07	1.24	1.02	....	....
30-30.9	1.23	1.24	....	1.23	1.22	....	....	....	....	1.15	1.21	1.15	$1.01	$1.09	1.10	1.28	1.04	....	f.o.b.
31-31.9	....	....	....	....	1.24	....	....	....	....	1.19	1.24	1.19	1.04	1.12	1.14	....	1.06	....	ship
32-32.9	....	....	....	....	....	....	....	....	....	1.23	1.28	1.23	1.07	1.14	1.17	....	1.09	....	....
33-33.9	....	....	....	....	....	....	....	....	....	1.27	....	1.26	1.10	1.17	....	....	1.11	....	$1.22
34-34.9	....	....	....	....	....	....	....	....	....	1.31	....	1.30	1.13	1.20	....	....	1.13	....	1.25
35-35.9	....	....	....	....	....	....	....	....	....	1.35	....	....	1.16	1.22	....	....	....	$1.23	1.28
36-36.9	....	....	....	....	....	....	....	....	....	1.39	....	....	1.19	1.25	....	....	....	1.26	....
37-37.9	....	....	....	....	....	....	....	....	....	1.43	....	....	1.22	....	....	....	....	1.29	....
38-38.9	....	....	....	....	....	....	....	....	....	1.47	....	....	1.25	....	....	....	....	....	....
39-39.9	....	....	....	....	....	....	....	....	....	1.51	....	....	....	....	....	....	....	....	....
40-40.9	....	....	....	....	....	....	....	....	....	1.53	....	....	....	....	....	....	....	....	....

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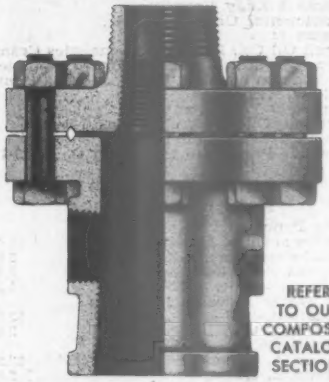

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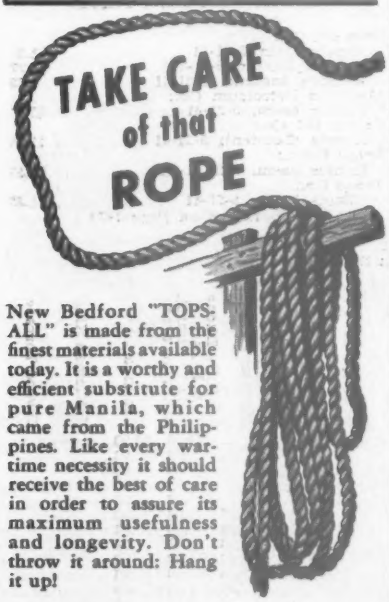

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3731

Among the Drilling Contractors

Delta Drilling Co., Tyler, Tex., co-discoverer of the Quitman pool of Wood County, has taken over operations of Beckett & Torrans 1 F. B. Smith, 3 miles northwest of Grand Saline, in Van Zandt County, Texas, and has set 10¾-in. casing at 800 ft.

Bass & Dillard, Wichita Falls, Tex., are drilling Amon G. Carter C-2 Walton, Ellenburger wildcat test in Winkler County, Texas, which flowed 15,000,000 cu. ft. of gas and 16½ bbl. of distillate and gasoline from Ellenburger dolomite topped at 9,217 ft. The test promises to be one of the most important drilled in the Permian basin in years, having already drilled over 100 ft. of pay.

Rowan Drilling Co., contractor drilling wells for Shell Oil Co., Inc., in the Quitman pool of Wood County, Texas, is contemplating drilling a Paluxy test for its own account in the northeastern part of the county.

A. R. Dillard, Wichita Falls, Tex., is completing a small producer for his own account 1 mile east of Scotland, Archer County, Texas. It is 4,140 ft. deep, and is being put on the pump.

Taubert & McKee, Fort Worth, Tex., are drilling below 3,300 ft. on the third well in the Ellenburger lime pool they opened last year with Sinclair Prairie Oil Co. in northern Jack County, Texas, and have staked location for a shallow Strawn test in the Antelope pool of southwestern Clay County.

Clay Brothers Drilling Co., Fort Worth, Tex., is drilling below 3,000 ft. on a wildcat in eastern Throckmorton County, Texas, for Bruce Sullivan, and have another contract for the same operator to start soon.

R. C. Lipscomb, Wichita Falls, Tex., completed a dry hole at 3,962 ft. in the Illinois Bend pool of northeastern Montague County, Texas, which he opened last year at his No. 1 Harmon.

Helmerich & Payne, Tulsa, finished a wildcat in Otero County, New Mexico, for H. L. Hunt. It went to 2,175 ft. in granite.

Drilling & Exploration Co., Hobbs, N. M., has one well drilling in the Maljamar pool, Lea County, New Mexico, at 3,800 ft., another drilling below 4,000 ft. on the west edge of the Wasson pool, Yoakum County, Texas, and two wells shut in for potential in the same area.

M. & M. Drilling Co., Midland, Tex., successfully completed a well in the Powell pool of Crockett County for a 97-bbl. pumper from lime pay at 2,575 ft.

Wynn Crosby Drilling Co., Houston, Tex., has set surface pipe at 1 Garcia, a wildcat test in Section 407, 2½ miles east of the Fitzsimmons field, Duval County, Texas. The well, which is for Crosby's own account, is being drilled by Gorman Drilling Co., San Antonio, Tex. Projected depth is 5,000 ft.

Harry L. Edwards Drilling Co., Houston, Tex., was coring below 7,600 ft. at the 1 A. L. and W. C. Witcher, wildcat test in the Alief area of Harris County, Texas, which it is drilling for Cities Service Oil Co. The Edwards company recently completed a dry hole for Phillips Petroleum Co., in the Millican area of Brazos County. It was the Annie B. Renchie.

W. W. Zimmerman, McAllen, Tex., is the contractor on the Ike Howeth 1 E. P. Caffarelli, wildcat test 10 miles north of Rio Grande City, Starr County, Texas, which is expected to open a new field. Production tests were under way at the week end. The well is on a Humble farmout lease.

Olson Drilling Co., Tulsa, was moving in materials for Northern Ord-

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Fig. 7002 Fig. 7001

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nance, Inc. 1 Finley Bradshaw, SE SE 28-22n-17w, southwest of Driscoll in Woodward County, Oklahoma. Contract depth is 9,750 ft., on the Wilcox sand. Location is nearly 100 miles from nearest production.

Parker Drilling Co. has contract for Midstates Oil Co. 1 Seegers in the Haynesville area, NW NW NW 3-23n-8w, Claiborne Parish, northern Louisiana. It will be a Pettit lime test.

Penrod Drilling Co. has started work on a 6,500-ft. wildcat test for Placid Oil Co. at the 1 Hodge unit. Location is C NE 16-15n-6w, north of the town of Lucky in Bienville Parish, Louisiana.

Red Iron Drilling Co. was starting work on two tests for T. F. Hodge in the Sugar Creek field of Claiborne Parish, Louisiana. The wells and their location are 2 Byrd in NW NW NW 18-19n-5w, and 3 Byrd in NE NE NE of the same section.

W. G. Ray has drilling contract for a Wilcox test at the Sohio Production Co. 1 Splane, SE NE 34-12n-8e, a wildcat near the town of Wisner in Franklin Parish, Louisiana.

Clifford A. Perry has been contracted to drill Clifford A. Perry-Gould and Cross 1 Dick ver Hage, SE NE SE 15-5n-14w, Ottawa County, Michigan.

Muskegon Development Co. has the contract to drill Gulf Refining Co. 1 William Wildgan, C S½ SE NW 12-14n-4e, Bay County, Michigan.

Eugene Hilliard has been awarded contract to drill Pure Oil Co. 1 H. M. Christen, C N½ SE NE 11-20n-3w, Clare County, Michigan.

T. H. Riley will drill J. T. Norris 1 Ward A. Stowe, C SW SW 9-2n-3e, Livingston County, Michigan.

Fisher-McCall Oil & Gas Co., Inc., has been awarded contract to drill Socony-Vacuum Oil Co., Inc., 1 Varnum, Marr and Hills (Comm.), SW SE SW 24-1s-16w, Van Buren County, Michigan.

Stewart Godfrey has contracted to drill T. C. Hudson 1 Cross estate, SW NW NE 35-1s-16w, Van Buren County, Michigan.

Addison Drilling Co. has contract for Repollo Oil Co. 1 Ira Johnson, NW NW NW 6-17s-31e, a new test on the northern tip of the Grayburg-Jackson pool of Eddy County, New Mexico.

Allegany Operators Try New Manpower Service

The New York State Oil Producers Association is sponsoring a plan designed to bring the man and the job together in the interest of better oil production in the oil fields of the Wellsville, Bolivar and Allentown areas. Here is how the plan works: A contractor or producer needs an extra man for a short job of a day or so. Somewhere nearby is an experienced man who is not scheduled to work that day. Each one calls nearest of the three exchange offices, and thus finds out about the other.

Appellate Court Orders Retrial in Ohio Oil Case

DENVER, Colo.—The federal Court of Appeals here has overruled and reversed an opinion of Federal Judge Edgar S. Vaught of Oklahoma in the case of Ohio Oil Co., Tulsa, against J. R. Sharp, of Shawnee, Okla., and Shreveport, La. The Circuit Court ordered Judge Vaught to retry the matter which revolved around the point of whether information on the ability of an area to produce can be stolen or not.

Ohio Oil Co. contended that Mr. Sharp, in opening the Centerpoint pool in Sections 21 and 28 of 9n-4e. in Pottawatomie County, Oklahoma, had drilled on information taken from Ohio and illegally furnished Mr. Sharp by a former employe of the seismograph crew Ohio had employed to survey its property.

Judge Vaught held that the point was fanciful and denied Ohio's claim for redress.

Moore Brothers and Olson Sell Property

John I. Moore and P. D. Moore, Midland, Tex., and Olson Oil Co., have sold their holdings in the Olson pool of western Crockett County, Texas, to Plymouth Oil Co., for a reported consideration of $330,000 cash, plus an override and other considerations. The Moore Brothers and Olson Oil Co. held somewhat over 5,000 acres in the Olson area along with two producers and one drilling well.

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PERSONALS

GEORGE O. SUMAN

Superintendent for Tide Water Rose Through Ranks

GEORGE O. SUMAN, superintendent of production and development in California's San Joaquin Valley for Tide Water Associated Oil Co., and chairman of the San Joaquin chapter of the A.P.I., came up through the ranks of the geological and engineering phases of the industry.

During summer vacations from college, he worked in the engineering department of Southern California Edison Co., at Kernville, Calif., on tunnel-survey assignments, as a warehouse man for Roxana Petroleum Co. at Velasco, Tex., and as a plane-table operator in the geological department at Brownwood.

He was first employed by Tide Water June 20, 1920, as assistant resident geologist in the Kern River division, Bakersfield, Calif., and was made resident geologist a year later.

Mr. Suman was transferred to the Los Angeles Basin district in 1928 but returned to the San Joaquin operations a year later as petroleum engineer for the east side of the valley and for the Kettleman-Coalinga division. He was appointed superintendent of production and development for all Tide Water operations in the San Joaquin Valley in April 1936 and has held that position to the present time.

His gravitation to the oil industry was quite natural. He was born in the Daleville, Ind., farming community where his father was active in development of gas properties.

George Berlin, production superintendent at Amarillo, Tex., for Skelly Oil Co., has been transferred to the Tulsa office of the company as an assistant in the production department. **Dallas Bowser,** former farm boss, has been promoted to the superintendency at Amarillo.

Hubert H. Somerville has been appointed assistant superintendent of mining lands for Alberta, and mining recorder for the Edmonton district, replacing **James W. Hamilton,** who recently joined the staff of Home Oil at Calgary.

R. H. Frizzell, Jr., formerly associated with Bass & Dillard, contractors of Odessa, Tex., is now scouting for Skelly Oil Co. at Midland, Tex.

Harvey Allen and **R. W. Adams** are principal stockholders in a new Texas Panhandle oil company, which will operate under the firm style of AA Oil Co. Headquarters will be in Amarillo, Tex.

Second Lt. Raymond E. Campbell, who was in the legal department of Gulf Oil Corp., Houston, Tex., until he entered war service in June 1942, is now a battery commander in the antiaircraft coast artillery. At the latest report he was on duty somewhere in the Atlantic.

H. D. Ward, regional industrial relations manager for Humble Oil & Refining Co. and personnel manager of its Corpus Christi office, was at Texas College of Arts and Industries, Kingsville, last week, giving aptitude tests and interviewing students in the business and administration department. Humble conducts these tests and interviews at intervals at all colleges in the areas in which it operates with a view of determining qualifications of young men and women who later may be prospective employes of the company.

D. B. McCorquodale, junior exploitation engineer for Shell Oil Co., Inc., in the Houma district, Terrebonne Parish, Louisiana, has finished a course of training at the U. S. Naval Academy, Annapolis, Md., and is now at a submarine school at Key West, Fla., where he is to remain until the middle of April.

John H. Thacher, Jr., technical consultant in the Natural Gas and Natural Gasoline Division, and **David G. Hawthorn,** chief of the materials and equipment section, Petroleum Division, are two of the new executives in the Petroleum Administration for War at Washington, D. C. Before entering government service with the WPB, Mr. Thacher was an analyst in the natural-gas division of Standard Oil Co. of California. Mr. Hawthorn is on leave of absence from Amerada Petroleum Corp., Tulsa, which he previously served in the production department.

J. H. THACHER, JR.

D. G. HAWTHORN

Pope Stedman, formerly industrial engineer for United Gas Corp., Houston, Tex., has been advanced from major to lieutenant colonel at Fort Leavenworth, Kans. Colonel Stedman, who is a graduate of Texas A. and M. College, was a captain in the Officers Reserve Corps when he was called into active service in December 1940, assigned first to Fort Riley.

John H. Schaefer, who has been elected a vice president of Ethyl Corp. in charge of all manufacturing, traffic and manufacturing research activities. He joined the Ethyl staff in 1926 as head of the blending plant at Deepwater, N. J. He is a native of Buffalo, N. Y., and holds degrees in science from the University of Delaware and the Massachusetts Institute of Technology.

Glenn E. Thompson, Tulsa, has resigned as attorney in charge of the tax, insurance and claims department for Tide Water Associated Oil Co., Mid-Continent division, effective June 1 and will become a professional tax consultant in Dallas, Tex., after that date.

Louis Abramson, Jr., president of Petrolane Gas Corp., New Orleans, La., was elected president of Liquefied Petroleum Gas Association, Inc., at its recent meeting in Washington, D. C. He also was named a member of the liquefied petroleum gas industry advisory committee of the War Production Board.

Capt. Joseph T. Dawson, whose distinguished part in a recent Tunisian battle was the subject of a news dispatch, was a geologist for Renwar Oil Corp., Corpus Christi, Tex., when he entered military service in April 1941. He was commissioned a second lieutenant at Fort Benning, Georgia, in April 1942, and 3 months later was advanced to first lieutenant. He was sent to England, then to Africa, and received a captain's commission last January.

L. E. Ulrope, northern sales manager of Esso Marketers, has been named president of the Colonial Beacon Oil Co., it was announced after the annual meeting of the directors of the company in Boston. Mr. Ulrope was formerly vice president and director of the company. He succeeds **A. Clarke Bedford,** who resigned the presidency because of the press of his duties as general sales manager of Esso Marketers, of which Colonial Beacon Oil Co. is an affiliate.

The Technical Club, Houston chapter, at its meeting March 29, elected the following officers to serve for the coming year: **Larry O'Donnell,** Shell Oil Co., Inc., succeeds **Harry Miller,** Ohio Oil Co., as president. **W. A. Davis,** Baker Oil Tools, Inc., succeeds **Roy Bandy,** Wilson Supply Co., as vice president. **Lynn Meador,** Quintanna Petroleum Co., succeeds **R. E. Bridges,** Humble Oil & Refining Co., as secretary-treasurer.

Herbert Hoover, Jr., head of United Geophysical Co., and **A. A. Curtice** are working on a set of exploration laws which will be submitted upon conclusion to the Venezuelan Congress to govern exploration and rights of discovery upon which future royalties will be paid by operators.

Joseph M. Weaver, president of West Central Texas Oil and Gas Association, left for Washington, D. C., Saturday, April 3, to consult with Sens. W. Lee O'Daniel and Tom Connally regarding the unfair crude prices. Mr. Weaver represents 3,786 members of the association.

Michael J. Foley, chairman of the Production Division, District 4, PAW, headquarters in Denver, is in Washington, D. C., going over district matters with officials in that city.

Ralph D. Copeley, who was elected president of the Rocky Mountain Association of Petroleum Geologists at its recent annual meeting, came to Denver in December 1936, since when he has been handling the drilling, producing and pipe-line work of the California Co., wholly owned subsidiary of the Standard Oil Co. of California, as district operating superintendent for the Rocky Mountain district. Prior to coming to Colorado he was district petroleum engineer for the parent company in the Los Angeles Basin fields.

O. V. Henry, district superintendent for the Ohio Oil Co., Michigan division, has been promoted to general superintendent with headquarters at Mount Pleasant, Mich. **D. Leon Province** becomes district superintendent at Reed City and his position as district foreman at Reed City has been taken by **E. J. Fredell,** recently transferred from Shelby, Mont. **Wilber Henderson** has been appointed

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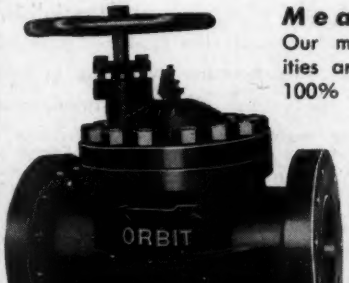

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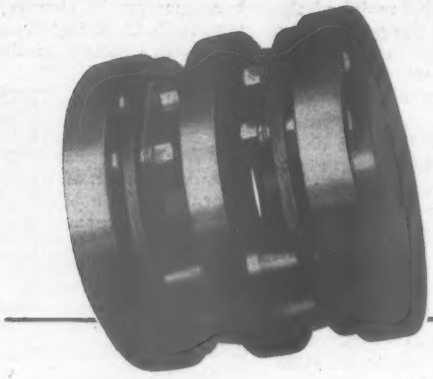

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farm foreman of the recently opened Cedar district and **Eugene Carmichael** is district office manager. **J. Shonk,** transferred to Michigan from Haynesville, La., has been named district foreman for the Newaygo and Norwich areas with headquarters at Big Rapids.

Capt. John D. McCamey, former safety engineer at Carter Oil Co., Tulsa, has written his family that he has arrived safely overseas after an Atlantic convoy crossing. Captain McCamey is attached to a petroleum-distribution unit of the Army Engineers.

M. L. Baker, of Standard Oil Co., with offices at the headquarters of the company in San Francisco, has been named a member of WPB's liquefied petroleum gas industry advisory committee.

Bryce Gillespie, assistant treasurer of General Petroleum Corp., recently received his 30-year pin from **S. J. Dickey,** president of the company, in Los Angeles, Calif.

Haymond C. Willis, for 16 years in the land department of Magnolia Petroleum Co., has been made head of the land division of Pan American Production Co., Houston, Tex. For a short time before joining Pan American he was in the land and leasing business for himself. Mr. Willis succeeds **V. I. Grisham,** who held the top land position with Pan American for 5 years and who plans to engage in the lease brokerage and well-promotion business as in independent.

George V. Cohee, oil and gas geologist, Indiana Department of Conservation, has been granted leave of absence to take a position as petroleum analyst with the Petroleum Administration for War.

R. L. Westbrook, formerly deputy commissioner in the Railroad Commission office at Pampa, Tex., has been transferred to Midland, Tex. Mr. Westbrook formerly resided in Cooke County, Texas.

Ed M. Dons, formerly chief engineer of Mid-Continent Petroleum Corp., Tulsa, has been appointed assistant general superintendent of the plant, and **N. B. York,** who has been with the company since 1917, is now process superintendent, lubricating-oil department. **James A. Middleton,** formerly chief assistant to Mr. Dons, has been named chief designing engineer. **Oswald G. Mauro,** process control and experimental engineer; **Dwight B. Mapes,** solvent process supervisor, and **Harry Morton,** superintendent of stills, have all been given new responsibilities.

Full Text of Order P-98-B

(Continued from Page 30)

13. "Authorized controlled material order" means any delivery order for any controlled material as such (as distinct from a product containing controlled material) which is placed pursuant to an allotment as provided in Paragraph (e) of this order or which is specifically designated to be such by any regulation or order of the Petroleum Administration for War or the War Production Board.

(b) **Scope of order.**—(1) Except as provided in Schedule B hereof, this order shall apply to the delivery of any maintenance, repair and operating supplies to any operator for use in the petroleum industry upon the terms and conditions hereinafter set forth.

2. No operator may use an allotment symbol or apply a preference rating to secure delivery of any maintenance, repair and operating supplies other than in accordance with the applicable provisions of this order.

3. Any allotment symbol issued or any preference rating assigned to any operator prior to April 1, 1943, shall not be considered revoked by the provisions of Subparagraph 2 of this Paragraph (b).

4. Supplementary orders or directions with respect to the use of allotment numbers or preference ratings or the delivery or use of material under the provisions of this order may be issued from time to time.

(c) **Method of securing maintenance, repair and operating supplies.**—(1) To secure deliveries of maintenance, repair and operating supplies—including without limitation controlled materials (other than aluminum), Class A, or Class B products—an operator is hereby authorized to use allotment symbol MRO-P-98-b and is hereby assigned a preference rating of AA-1.

2. In using such allotment symbol or preference rating, the operator shall be subject to all the applicable provisions of this order and shall endorse upon each delivery order for maintenance, repair and operating supplies a certification in substantially the following form, signed manually or as provided in Priorities Regulation 7:

The undersigned purchaser certifies, subject to the penalties of Section 35A of the United States Criminal Code, to the seller and to the War Production Board, that, to the best of his knowledge and belief, the undersigned is authorized under applicable War Production Board regulations or orders to place this delivery order, to receive the item(s) ordered for the purpose for which ordered, and to use any preference rating or allotment number or symbol which the undersigned has placed on this order.

The operator shall place the allotment symbol and preference rating indicated in Subparagraph 1 of this paragraph (c) on the delivery order in every case where the above certification is used.

3. Any operator requiring aluminum (in any of the forms or shapes constituting a controlled material) for essential maintenance, repair and operating supplies, where the use of other material for this purpose is impracticable, may obtain such aluminum from a controlled material producer or from an approved aluminum warehouse in amounts of not to exceed 100 lb. from all sources during any one calendar quarter, by endorsing upon any delivery order a certification in substantially the following form, signed manually or as provided in Priorities Regulation 7:

The undersigned purchaser certifies, subject to the penalties of Section 35A of the United States Criminal Code, to the seller and to the War Production Board, that, the materials covered by this order are required as essential maintenance, repair and operating supplies; that the use of other materials for such purpose is impracticable; and that the amount of aluminum covered by this order, together with all other amounts received by, or on order for delivery to the undersigned, from all sources, for such purposes during the same quarter, will not exceed 100 lb.

Any supplier (producer or warehouse) receiving a delivery order bearing such certification shall be entitled to rely thereon and may fill the order, unless he knows or has reason to believe the certification to be false.

4. Prior to placing with a supplier a delivery order bearing the allotment symbol and preference rating indicated in Subparagraph 1 of this paragraph (c) for maintenance, repair and operating supplies, each operator shall, subject to the provisions of Paragraph (e) of this order, comply with the following conditions:

(i) Each operator shall submit, for information purposes only, (to the appropriate District Office of the Petroleum Administration for War or the Office of Oil Controller) a copy of any delivery order where the total cost to the operator of all items on the delivery order is $100 or more, but less than $1,000, and the cost of every item on the delivery order is less than $500.

(ii) Each operator shall submit for approval by the appropriate District Office of the Petroleum Administration for War or the Office of Oil Controller two copies of every delivery order where the cost to the operator of any item on the delivery order is less than $500 and the total cost to the operator of all items on the delivery order is $1,000 or more.

(iii) Each operator shall submit for approval by the Washington Office of the Petroleum Administrator for War or the Office of Oil Controller two copies of any delivery order where the cost to the operator of any item on the delivery order is $500 or more.

In submitting a delivery order to the Petroleum Administration for War or the Office of Oil Controller in accordance with Paragraph (c) (4) (ii) or (c) (4) (iii), an operator shall furnish an accompanying statement indicating the use to which the material is to be put and such additional explanations as may be necessary to enable the proper officials to make an accurate determination of the operator's needs. No delivery order need be submitted by an operator prior to placing such order with a supplier where the total cost to the operator of all items on the delivery order is less than $100.

5. No operator may place with a supplier any delivery order submitted in accordance with Paragraph (c) (4) (ii) or (c) (4) (iii) until approval has been received from the authorized official of the Petroleum Administration for War or the Office of Oil Controller.

6. In placing a delivery order bearing an allotment symbol or preference rating, no operator shall alter the customary designation of any item or subdivide an ordinary purchase of any item or items for the purpose of making it appear that an item costs less than $500; that the total cost of all items on the delivery order is less than $1,000 or that the total cost of all items on the delivery order is less than $100.

7. Whenever submission of a delivery order to the District Office of the Petroleum Administration for War or the Office of Oil Controller is required by the provisions of Paragraph (c) (3) of this order, the operator as defined in Paragraph (a) (2) (i) shall submit such delivery order to the District Office of the Petroleum Administration for War in the district where the material is to be used and the operator as defined in Paragraph (a) (2) (ii) shall submit such delivery order to the Oil Controller of the Dominion of Canada.

(d) **Emergency provisions.**—(1) If there has been an actual breakdown or suspension of operations and if the method specified in Paragraph (c) (4) (ii) or (c) (4) (iii) for using the allotment symbol and preference rating will not permit an operator to obtain material on the date when such material is required, the operator to obtain delivery of material for this emergency may communicate by letter, telegram or telephone with the Petroleum Administration for War, Washington, D. C., Ref.: P-98-b, supplying the following information:

(i) Date of actual breakdown or suspension of operations and exact explanation as to what extent operations are affected;

(ii) Description of equipment to be repaired and its function in maintaining continuous operation; and

(iii) Price, quantity, and detailed description of necessary material (including weight if a controlled material.)

A delivery order for maintenance, repair and operating supplies for emergencies need not be sent to the Petroleum Administration for War but in every instance the number and date of the delivery order must be transmitted to the Petroleum Administration for War, Washington, D. C. Whenever any information required to be furnished to the Petroleum Administration for War under this paragraph (d) is furnished by telephone, the operator furnishing such information shall confirm such information within 7 days by a letter or telegram containing information requested in Paragraph (d) (1) (i), (ii) and (iii).

2. No operator may place a delivery order with a supplier, where approval has been requested pursuant to Paragraph (d) (1), until approval has been received from the authorized official of the Petroleum Administration for War. In placing any such delivery order the operator shall use the certification provided in Paragraph (e) (2) in the same manner and to the same extent as provided therein.

(e) **Placement of delivery orders; application and extension of preference ratings.**

1. An operator who has complied with the provisions of Paragraph (c) or (d) of this order may place a delivery order with any supplier for delivery of material authorized pursuant to such paragraphs and may place upon such delivery order the allotment symbol and preference rating which have been duly authorized in accordance with the provisions of this order. Any delivery order rated under this order shall be identified by placing thereon the allotment symbol provided for in Paragraph (c) (1) of this order.

2. Any delivery order for controlled materials (other than aluminum) placed pursuant to this order and bearing the certification provided for in Paragraph (c) (2) hereof shall constitute an authorized controlled-material order; **provided** that such delivery order must be in sufficient detail to permit entry on mill schedules and must be received by the controlled-materials producer at such time in advance as is specified in Schedule 3 of CMP Regulation 1, or at such later time as the controlled-materials producer may find it practicable to accept the same, except that no controlled-materials producer shall discriminate between customers in rejecting or accepting late orders.

3. Any delivery order rated pursuant to this order and bearing the certification provided for in Paragraph (c) (2) hereof shall have the same status as an order bearing an allotment symbol and preference rating under CMP Regulation 3. The allotment symbol MRO-P-98-b shall constitute an allotment symbol for the purposes of CMP Regulation 3.

(f) **Restrictions.**—No operator shall use the allotment symbol or the preference rating provided for in this order:

1. To obtain deliveries of material in greater amounts or on earlier dates than required to fulfill the purpose authorized pursuant to the provisions of this order.

2. To obtain deliveries of material for any purpose other than a purpose authorized pursuant to the provisions of this order.

3. To obtain deliveries of material which can be secured without the use of an allotment symbol or preference rating.

4. To obtain deliveries of material the use of which could be eliminated without serious loss of efficiency by substitution of less scarce material or by change of design.

5. To obtain deliveries of material in

such amounts or at such dates that receipt of such amounts on the requested dates would result in surplus material, as defined in or modified by Preference Rating Order P-98-c.

6. To obtain deliveries of material unless such operator is on or after May 1, 1943, a participant in the PAW Materials Redistribution Program 2 in the event that participation by the operator in such program is required by the terms of the program.

7. To obtain deliveries of material in violation of any applicable order or regulation of the Petroleum Administration for War or of the War Production Board.

(g) **Applicability of other orders and regulations.** — (1) This order and all transactions affected hereby, except as herein otherwise provided, are subject to all applicable regulations of the War Production Board, as amended from time to time.

2. None of the provisions of CMP Regulation 2 or 5 shall apply to operators as defined in Paragraph (a) (2) of this order, and no such operator shall obtain any material under or be limited by the provisions of such regulations.

(h) **Communications.** — All reports which may be required to be filed hereunder and all communications concerning this order shall, unless otherwise directed, be addressed:

1. By any persons located in the United States, its territories or possessions to: Petroleum Administration for War, Interior Building, Washington, D. C., Ref.: P-98-b.

2. By any person located in the Dominion of Canada to: Office of Oil Controller, Dominion of Canada, Toronto, Canada, Ref.: P-98-b.

(i) **Violations.**—Any person who wilfully violates any provision of this order or who wilfully furnishes false information to the Director General for Operations in connection with this order is guilty of a crime, and upon conviction may be punished by fine or imprisonment. In addition, any such person may be prohibited from making or obtaining further deliveries of or from processing or using material under priority control and may be deprived of priorities assistance by the Director General for Operations.

Issued this first day of April 1943.

WAR PRODUCTION BOARD,

By J. JOSEPH WHELAN,

Recording Secretary.

SCHEDULE A

Part 1—Maintenance and Repair

"Maintenance and repair" means, without regard to accounting practice, any material which:

1. Is used in production or natural gasoline production for any of the following purposes:

(i) The upkeep of material or equipment in a sound working condition.

(ii) The restoration of material or equipment which has been rendered unsafe or unfit for service by wear and tear, damage, destruction, failure of parts or similar causes.

(iii) A capital addition (excluding the installation or replacement of pumping or other artificial-lifting equipment and the deepening or plugging back of any well) not exceeding in material cost $500 for any one complete operation which has not been subdivided for the purpose of coming within this definition.

Provided, that upkeep or restoration shall not include any use of material for the improvement of material or equipment by the replacement of material which is still serviceable in the existing material or equipment.

2. Is used in transportation, refining, or research for any of the following purposes:

(i) The upkeep of material or equipment in a sound working condition.

(ii) The restoration of material or equipment which has been rendered unsafe or unfit for service by wear and tear, damage, destruction, failure of parts or similar causes.

(iii) A capital addition not exceeding in material cost $500 for any one complete addition which has not been subdivided for the purpose of coming within this definition.

Provided, that upkeep or restoration shall not include any use of material for the improvement of material or equipment by the replacement of material which is still serviceable in the existing material or equipment.

3. Is used in marketing for any of the following purposes:

(i) The upkeep of any structure or equipment in a sound working condition.

(ii) The restoration of any structure or equipment or part thereof to a sound working condition when such structure or equipment or part thereof has been rendered unsafe or unfit for further service by wear or tear, damage, destruction, or failure of parts or similar causes.

(iii) A capital addition to any terminal or bulk plant (but not to any service station or retail outlet) not exceeding in material cost $500 for any one complete addition which has not been subdivided for the purpose of coming within this definition.

Provided, that upkeep or restoration shall not include any use of material for the improvement of any structure or equipment by the replacement of material which is still serviceable in the existing structure or equipment or any use of material for a capital addition to any service station or retail outlet.

Part 2—Operating Supplies

"Operating supplies" means any material (other than maintenance and repair material) which is essential to and consumed in production, natural-gasoline production, transportation, refining, marketing, or research and which is normally carried by an operator as operating supplies or which is normally chargeable to operating expense:

Provided, that the term "operating supplies" shall not include any material specified in Schedule B of this order which is declared by such schedule not be be operating supplies.

SCHEDULE B

Part 1

1. No operator other than as specifically provided for in this schedule, may apply a preference rating assigned by or pursuant to this order to obtain delivery of any of the following items:

(a) Automotive replacement parts or maintenance equipment other than specialized petroleum-industry equipment.

(b) Clothing, shoes, or other wearing apparel, if made of leather or textiles; **provided,** that such a preference rating may be applied to obtain delivery of the following items which shall be considered as operating supplies obtainable under the provisions of this order when specifically designed and used to furnish protection against specific occupational hazards (other than weather):

(i) Asbestos clothing.

(ii) Safety clothing impregnated or coated for the purpose of making the same resistant against fire, acids, other chemicals, or abrasives.

(iii) Safety industrial rubber gloves and hoods and linesman's rubber gloves and sleeves.

(iv) Gauntlet-type welders' leather gloves and mittens, and electricians' leather protector or cover gloves.

(v) Other safety leather gloves or mittens but only if steel stitched or steel reinforced.

(vi) Safety industrial leather clothing other than gloves or mittens.

(vii) Metal mesh gloves, aprons, and sleeves.

(viii) Plastic and fiber safety helmets.

(c) Fabricated containers (in knockdown or set-up forms, whether assembled or unassembled), required for packaging products to be shipped or delivered; **provided** that such a preference rating may be applied to obtain delivery of the following items which shall be considered as operating supplies obtainable under the provisions of this order:

(i) Sample cans used by an operator for the purpose of moving samples to laboratories.

(ii) Lead seals, box strapping, dunnage, and other materials used for any of these packaging purposes.

(iii) Material necessary for the further continued use of existing fabricated containers.

(d) Fuel, electric power or lubricants.

(e) Office machinery or office equipment.

(f) Paper, paperboard, and products manufactured therefrom—moulded pulp products; **provided,** that such a preference rating may be applied to obtain deliveries of the following items which shall be considered as operating supplies obtainable under the provisions of this order:

(i) Photographic and sensitized paper.

(ii) Tracing paper.

(g) Printed matter and stationery.

(h) Softwood lumber as defined in Conservation Order M-208.

Part 2—Material Excluded From Provisions of This Order

1. No operator may apply a preference rating assigned by or pursuant to this order to obtain delivery of any of the following material:

(a) Material or equipment which is to be used by consumer accounts for or in the storage or dispensing of petroleum, including liquefied petroleum gas.

(b) The material listed below where it is to be used in service-station operations:

(i) Drills, reamers, and taps manufactured of high-speed steel as defined in Supplementary Order M-21-h of the War Production Board.

(ii) Hacksaw blades manufactured of high-speed steel as defined in Supplementary Order M-21-h of the War Production Board.

(iii) Hand service operating tools.

(iv) Precision measuring hand tools.

(v) Portable electric tools.

(c) Material or equipment which is to be used in transportation by mobile facilities; **provided,** that such a preference rating may be applied to obtain delivery of material:

(i) Where such material is to be used on a tank truck or trailer and is specialized petroleum material or equipment which is actually to be attached to the truck or trailer and is necessary to the containing, dispensing, measuring the movement of, or distributing of petroleum.

(ii) Where such material is to be used on railroad rolling stock and the rolling stock is owned or leased by the operator, used on his premises and in the petroleum industry, and is not under the jurisdiction of the Interstate Commerce Commission.

(iii) Where such material is to be used on marine equipment and the marine equipment is used or chartered by the operator, is used on or in the vicinity of his premises and in the petroleum industry, and is not under the jurisdiction of the U. S. Maritime Commission, the Navy Department, or any other federal agency for the purpose of establishing methods by which material incident to the operation of the marine equipment may be made available.

PART 958—REPAIRS, MAINTENANCE AND OPERATING SUPPLIES

(Revocation of Preference Rating Order P-100)

§ 958.2 **Preference Rating Order P-100** is hereby revoked as of April 2, 1943, except that any serial numbered copy of said order issued to a producer located in the Dominion of Canada shall remain in effect until either (1) the same is specifically revoked, or (2) such producer becomes eligible to apply the ratings assigned by CMP Regulation 5.

Issued this second day of April 1943.

WAR PRODUCTION BOARD,

By J. JOSEPH WHELAN,

Recording Secretary.

Market Developments

Mid-Continent

MID-CONTINENT refiners this week reappraised all distribution arrangements in light of stipulations in Directive 65. Opportunities for effecting greater economies in use of tank cars, however, are strictly limited in District 2 because refiners, distributors and wholesalers long since had taken advantage of joint use of facilities to accomplish the same objective as sought by Directive 65.

Meanwhile, refiners are concerned over a trend which indicates that the Mid-Continent manufacturing branch of the industry will be hard pushed to meet essential demand for motor fuel during the summer and fall seasons. Consumption in agricultural districts and in the more highly congested defense-plant areas appears to be exceeding previous estimates. Refiners are declining to make commitments on forward shipments even at this comparatively early part of the consuming season. Inability to arrange for additional supplies of crude is one of the reasons why refiners are reluctant to accept future delivery obligations.

Distillate fuel oils and residuals, particularly the latter, continue in active demand at steady quotations. Buying of distillate fuels is slightly less urgent now than in the latter part of the winter season but most refiners report that contract customers are anxious to acquire the full gallonage covered by supply agreements. Railroads and defense plants are particularly active in the purchase of residual fuels.

East Coast

NEW YORK.—Encouraging developments in the critical East Coast supply situation occurred during the past week and, in view of the return of mild weather, are regarded as convincing evidence that the last period of severe shortage has passed.

Possibly the most significant of these developments was the joint PAW-OPA announcement that restrictions on the consumption of fuel oil for nonheating purposes were allowed to expire April 1. The situation with respect to fuel oil has been the most critical and the easing of restrictions is ample evidence that conditions have improved.

This does not imply that further difficulties next winter are not anticipated. A special fuel-oil advisory committee composed of oil-industry representatives is preparing what is hoped will be a more effective and less cumbersome procedure for the remainder of this year and next winter. One of its aims is to control consumption sufficiently this summer so that stocks can be built up prior to the season of heavy demand.

Another encouraging development was the announcement that the New York Barge Canal system would be open completely by April 10. Improvements in handling canal traffic are expected to make possible the delivery of 122,000 bbl. per day this year, more than double last year's average of 56,320 bbl.

The third encouraging development was the statement credited to G. A. Wilson, PAW transportation division, that next winter's fuel-oil requirements could be met without rationing unless unforeseen demands develop. Another was contained in the weekly A.P.I. bulletin showing a slight improvement in its East Coast supply index, the first after marked declines in recent weeks.

Gulf Coast

HOUSTON, Tex.—Easing of the Atlantic seaboard's clamor for heating and burner oils was reported by Gulf Coast refiners this week. Further improvement of a difficult market situation should attend northern movement of refined products by way of the big-inch line, which is expected to begin soon. The Pan American Pipe Line Co.'s feeder from Texas City to Longview is now in operation, connecting with the big inch at Longview. For the present the line is being utilized for shipments of crude, but it is understood No. 2 heating oil will begin running soon. This new outlet for Gulf Coast refiners will offer a means of transporting heavy accumulations of heating and burner oils to eastern points, there to be stored against next winter's requirements. Recurrence of the acute shortage of these materials which gripped the East Coast during the 1942-43 season is regarded as unlikely.

Although the peak of East Coast demand for heating and burner oils has been passed and although pipeline and truck movement of refinery products has afforded a little relief in the transportation problem, there is still a serious shortage of the tank cars upon which refiners must rely. A faint loosening of this tank-car scarcity was reported during the past week but it was said to have lasted a few days only.

Effect of wartime restrictions on the gasoline and motor-oil trade is indicated by an unofficial survey reported by Dudley E. Cornell, director of the marketing division of District 3, Petroleum Administration for War. Mr. Cornell says that more than 20 per cent of all service stations in the six states comprising the district have closed since the war began.

Pacific Coast

LOS ANGELES, Calif.—The strong fuel-oil market that has prevailed in California for the past 3 years during which the substantial withdrawals from storage had reduced stocks was finally appreciated by OPA which on March 26 authorized a 25-cent-per-barrel increase in light and heavy fuel oil. This increase was justified in order to stimulate development work in fields producing heavy grades of crude oil but with ceiling prices frozen nothing could be done to effect relief. Anticipating the price increase, operators had already undertaken extensive development in fields producing heavy oil.

The price increase in heavy crude and fuel comes at a time when PAW has instructed refiners in California to use as much heavy oil as possible and at the same time reduce runs of light crude so as to increase production of refinery residuum and cut down output of gasoline. Motor-fuel stocks have been increasing at an alarming rate during the past few months and, as is usually the case during conditions of this kind, prices are deflated and little trading is done.

A.P.I. REFINERY REPORT

Week Ended March 27, 1943

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline	Stocks: Residual	Stocks: Gas oil
Appalachian	158	2,497	447	881
Ind., Ill., Ky.	715	20,786	2,394	3,184
Okla., Kan., Mo.	340	7,314	1,351	1,665
Censored area*	1,722	40,715	10,087	14,127
Rockies	85	2,074	532	354
California	722	20,693	53,127	10,769
Total 3-27-43	3,742	94,079	67,938	30,980
Total 3-20-43	3,618	94,159	68,178	31,724
Total 3-28-42	3,633	107,162	92,517	30,659

*Reports combined on East Coast, Texas Gulf, Louisiana-Arkansas and Inland Texas at request of PAW.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
March 27, 1943	239,126,000
March 20, 1943	238,417,000
March 28, 1942	263,208,000

*Excludes unrefinable California stocks.

Refinery Prices

(Prices as of April 6)

Quotations are f.o.b. plant in cars and in cents per gallon except where otherwise noted. They are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon on lubricating oils, and do not include marine lighterage charges.

REFINERY GASOLINE

Octane (A.S.T.M.):	†80	74-76	72-74	68-70	63-66
Mid-Continent*	.....	.....	5.875-6.000	.....	5.500-5.625
Pennsylvania	.....	6.750-7.000	.....	.....	.....
Gulf Coast‡	6.00-6.50	.....	§5.750-6.250	§5.750-6.250	§§.250-5.750
Northeast Coast	9.80	.....	9.2	9.2	.....
California	.....	6.125-6.500	6.000-6.125	5.500-6.000	5.000-5.250

*Basis Group 3. †1939 C.F.R. (research method). ‡Integrated companies restricted to lowest prices. §Unleaded.

KEROSENE AND NO. 1 FUEL OIL

Gravity:	46	45	42-44	41-43	38-40
Mid-Continent*	.....	.....	4.500	4.375	.....
North Louisiana	.....	.....	.....	4.500-4.750	.....
Pennsylvania	6.250-6.625	6.125-6.250	.....	.....	.....
California	.....	.....	.....	4.500-5.500	4.250
Northeast Coast	.....	.....	.....	6.80	.....
Gulf Coast	.....	.....	.....	4.125	.....

*Basis Oklahoma Group 3.

TRACTOR, DIESEL, AND BUNKER FUEL OIL

Specifications:	46-48° G.	24 D.I.	48-52 D.I.	58 & above	Diesel bunkers	Residual Bunker C‖
Mid-Continent*	4.125	.....	.....	.....	.....	$0.80-1.27
California	.....	2.750-4.000	.....	.....	†1.35-1.45	0.85-1.60
Gulf Coast	.....	.....	4.000	4.125	1.45	0.85-1.27
Northeast Coast	.....	.....	.....	6.800	2.780	1.65-2.07
North Louisiana	.....	.....	.....	.....	.....	0.80-1.27

*Basis Oklahoma Group 3. †10-14° gravity. ‡Pacific Specification 200. §Gravity range.

FURNACE OIL, GAS OIL, FUEL OIL

	No. 2	No. 3	No. 5	No. 6
Mid-Continent*	3.625-3.750	3.500-3.625	$0.85	$0.80
Pennsylvania (West)	5.875-6.125	5.875-6.000	†5.250-5.500	.....
Northeast Coast	6.7	6.7	1.95	1.65
California	5.5	5.5	†1.10-1.25	§1.10-1.15
Gulf Coast	3.875-4.0	.....	1.65	0.85

*Basis Oklahoma Group 3. †36-40 gravity fuel. ‡Pacific Specification 300. §Pacific Specification 400.

NATURAL GASOLINE

Grades:	26-70	18-55
Oklahoma (Group 3)	3.875	4.650
North Texas	3.500	4.200
North Louisiana	3.625	4.350
California	4.875	5.500

LUBRICATING OILS

Bright and Steam Refined

OKLAHOMA (Group 3)—		
200-210 D, 10-25		27.00
150-160 D, 0-10		23.80
120-125 D, 0-10		22.00
Stea refined:		
600 dark green (untreated)	9.00	9.50
PENNSYLVANIA—		
Bright Stocks (Pennsylvania Grade No. 8 color, 140-150 at 210, 545-550 flash)		
10 pour point		30.50
15 pour point		29.50
25 pour point	25.00	28.00
Steam refined:		
600	15.00	16.00
650	15.50	16.50
600 flash	16.00	17.50
630 flash	17.00	17.50

Neutral Oil
(Vis. at 100° F. except Pennsylvania and color N.G.A.)

OKLAHOMA (Group 3)—	
0-10 pour point:	
200-3	15.00
300-3	18.00
500-3	19.50
600-3	20.00

Note: Viscous neutrals, 10-25 pour, quoted 0.5 cent under 0-10 oils.

Neutral Oils

CALIFORNIA—		
Pale Oils:		
200-2½-3	7.00	7.75
400-3-4	7.25	8.00
600-3-4	8.75	11.00
Red oils:		
200-4-5	7.00	7.75
400-5-6	9.00	11.00
500-900, 5-6½	9.25	11.25
GULF COAST—		
Pale oils:		
200-3	8.50	8.75
300-3	9.00	9.25
500-3½	9.75	10.00
750-3½	10.00	10.25
2,000-4	10.50	10.75
3,000-4	12.25	12.50
PENNSYLVANIA—		
150 vis. at 70° F., 3 color, 400-405 flash:		
Zero pour point		37.50
10 pour point		36.50
15 pour point		35.50
25 pour point		30.00
200 vis. at 70° F., 3 color:		
Zero pour point		39.50
10 pour point		38.50
15 pour point		37.50
25 pour point		32.00

WAX

(Cents per pound)

OKLAHOMA (Group 3)—	
124-126 (A.m.p.) w.c. scale	4.250
PENNSYLVANIA (inland refineries)—	
122-124 (A.m.p.) w.c. scale	4.250
124-126 (A.m.p.) w.c. scale	4.250
NEW YORK—	
Wax in bags fully refined:	
130-132 (A.m.p.) wax	5.850
133-135 (A.m.p.) wax	6.150
Crude scale:	
124-126 (A.m.p.) w.s.	4.250
124-126 (A.m.p.) y.s.	4.250

TANK-WAGON PRICES IN 50 CITIES

(Gasoline prices based on regular grades, tax included, undivided dealer)

ATLANTIC AND NEW ENGLAND
(Socony-Vacuum Oil Co., Inc., and Atlantic Refining Co.)

	Dealer tank wagon	Combined tax	Kero tank wag
Baltimore, Md.	15.95	5.50	10.20
Boston, Mass.	14.90	4.50	9.80
Burlington, Vt	16.90	5.50	10.10
Buffalo, N. Y.	16.20	5.50	10.60
Dover, Del	16.70	5.50	12.00
Hartford, Conn.	15.60	4.50	9.70
Manchester, N. H.	17.30	5.50	10.80
Newark, N. J.	15.20	4.50	9.70
New York, N. Y.	16.10	5.50	9.80
Philadelphia, Pa.	16.20	5.50	11.65
Pittsburgh, Pa.	16.70	5.50	12.00
Portland, Me.	16.30	5.50	9.90
Providence, R. I.	15.00	4.50	9.60
Washington, D. C.	15.20	4.50	11.00
Average 14 cities	16.02	5.14	10.49

(All prices undivided dealer basis.)

CENTRAL
(Standard Oil Co. of Indiana, Standard Oil Co. of Ohio, Continental Oil Co., and Texas Co)

	Dealer tank wagon	Combined tax	Kero tank wag
Chicago, Ill.	13.40	4.50	10.30
Cleveland, Ohio	15.00	5.50	*9.00
Dallas, Tex.	13.00	5.50	7.00
Des Moines, Iowa	14.40	4.50	9.80
Detroit, Mich	14.40	4.50	9.60
Fargo, N. D.	16.90	5.50	11.30
Huron, S. D.	16.30	5.50	10.70
Indianapolis, Ind	15.20	5.50	9.80
Little Rock, Ark.	17.50	8.00	10.00
Milwaukee, Wis.	16.10	5.50	10.50
Minneapolis, Minn.	15.40	5.50	10.30
Omaha, Neb.	15.49	6.50	9.80
Tulsa, Okla.	16.50	7.00	8.50
Wichita, Kans.	12.70	4.50	8.00
Average 14 cities	15.15	5.57	9.61

*Includes 1-cent state tax.

SOUTHEASTERN
(Standard Oil Companies of New Jersey, Kentucky, and Louisiana)

	Dealer tank wagon	Combined tax	Kero tank wag
Atlanta, Ga.	18.90	7.50	*11.50
Birmingham, Ala.	18.50	8.50	9.00
Charleston, S. C.	18.95	7.50	...
Charleston, W. Va.	19.25	6.50	13.30
Charlotte, N. C.	20.10	7.50	11.30
Jacksonville, Fla	18.90	8.50	9.50
Jackson, Miss.	17.50	7.50	†9.00
Louisville, Ky.	16.50	6.50	8.50
Memphis, Tenn.	17.90	8.50	10.50
New Orleans, La.	17.75	8.50	*10.00
Norfolk, Va.	17.45	6.50	12.00
Average 11 cities	18.34	7.50	10.46

*Includes 1-cent state tax.
†Includes ½-cent state tax.

MIDWESTERN
(Continental Oil Co.)

	Dealer tank wagon	Combined tax	Kero tank wag
Albuquerque, N. M.	17.50	7.50	10.00
Boise, Idaho	20.10	6.50	16.50
Casper, Wyo.	17.00	5.50	12.00
Denver, Colo.	14.50	5.50	11.00
Helena, Mont.	17.00	6.50	13.00
Phoenix, Ariz.	18.50	6.50	12.50
Reno, Nev.	17.50	5.50	13.50
Salt Lake, Utah	18.50	6.50	14.50
Average 8 cities	17.58	6.25	12.88

PACIFIC COAST
(Standard Oil Co. of California)

	Dealer tank wagon	Combined tax	Kero tank wag
Portland, Ore.	17.00	6.50	13.50
San Francisco, Calif.	14.50	4.50	11.50
Seattle, Wash.	17.00	6.50	13.50
Average 3 cities	16.17	5.83	12.83
Average 50 cities	16.55	5.96	10.76

Equipment Progress

New Liquid Seal Vent Valve

The Conser-Vent is a new liquid-seal vent valve designed for installation on storage tanks. Its purpose is to minimize the evaporation loss of volatile petroleum products in storage, and at the same time protect the tank and its contents against the hazards associated with excessive pressure and vacuum. It has no mechanical parts. Its principal operating units are (1) an oil seal which serves as a liquid "valve" and provides for all ordinary conditions; (2) a movable bell which automatically relieves extraordinary pressure conditions, and (3) two entrainment separators which entrap any oil particles that escaping gases may pick up and thus prevent depletion of the sealing liquid.

Normal "breathing" of the tank's contents causes the liquid seal to rise and fall in response to changing pressures. This principle equips the tank with a "breathing" apparatus that provides instant and constant relief without the loss of vapors.

When the withdrawal of gasoline or a drop in temperature causes a vacuum, air from the atmosphere enters the Conser-Vent, bubbles through the oil seal, relieving the vacuum and passes into the storage tank.

The Conser-Vent is designed and manufactured by the Conservation Equipment Corp., 624 South Michigan Avenue, Chicago. It is available in 3, 6 and 10-in. sizes and operates on tanks up to the largest capacity.

Manning, Maxwell & Moore Open Tulsa Plant

Manning, Maxwell & Moore, Inc., manufacturers of Consolidated safety and relief valves, Ashcroft gages, American glass and dial thermometers, American industrial instruments, and Hancock valves, with plants at Bridgeport, Conn.; Boston, Mass., and Muskegon, Mich., have opened a new plant in Tulsa to manufacture oil relief valves. When the plans for this new plant were first made, the War Production Board, deeming the plant so important, cleared the way for quick delivery of all essential materials. The plant is now in operation.

The key men are G. P. Kirchhofer, plant manager; John Scott, superintendent; and James W. Schwarberg, Jr., office manager and purchasing agent. The company's district sales office under the direction of Malcolm Black, southwestern district manager, will continue at 317 East Fourth Street, Tulsa, where it has been located for a number of years. This office handles the sales and servicing of their many products in the Mid-Continent area.

Trade Literature

Blackmer Pump Co., Grand Rapids, Mich. — A simplified check chart on the servicing of rotary pumps. The chart is prepared in card form, punched so that it may be hung on a pipe or wall near a pump installation. The original printing of this card was made early in 1942.

Mercoid Corp., 4201 Belmont Ave., Chicago, Ill.—A 64-page booklet on Mercoid heat controls, for heating, air conditioning, refrigeration and various types of industrial applications. The booklet is fully indexed for convenience, both alphabetically and by type number of control.

Shock-Resisting Glass Tanks By Pittsburgh Plate Glass

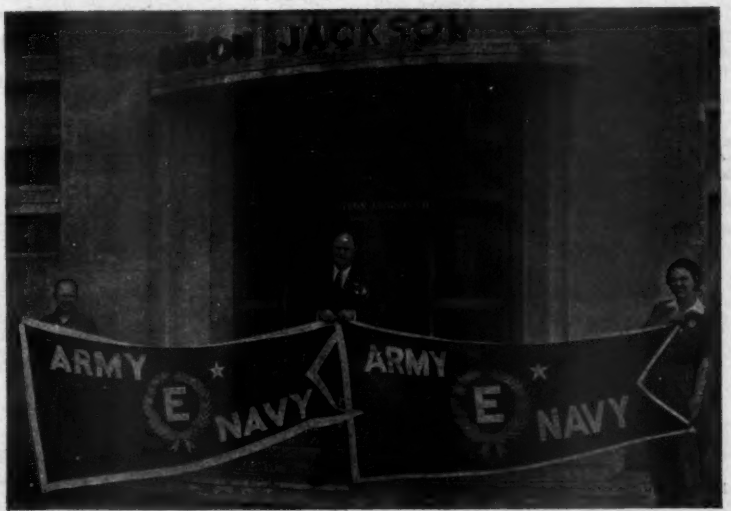
Pittsburgh Plate Glass Co., Pittsburgh, Pa., announces a line of glass tanks for industrial or commercial applications requiring a noncorrosive, shock-resisting material. They use a minimum of critical material and are not just glass lined, but are actually tanks made of glass, made by building up the required shape and size of heavy tempered-glass plates. The result is a rigid, permanent, sturdy tank, free from maintenance or wear.

The new method of heat treating gives to the tank material a physical strength four to five times greater than ordinary glass. Furthermore, the glass has a high resistance to thermal shock. It will withstand continuous operating temperatures of 650° and an instantaneous thermal shock of 400° to 500°.

The joining problem is comparatively simple since the glass is made in large sheets; and on all tanks of medium size nothing but the corners are involved. All joints are accurately ground so that they resemble, in a sense, the ground stopper of a chemist's bottle. In addition, use is made of a joining material developed especially by the company's research laboratory for this purpose. The entire tank is usually surrounded by a wooden framework filled with a compound. This frame serves both as insurance against leaks and as protection against severe physical blows.

BYRON JACKSON ADDS STAR TO ARMY-NAVY "E" FLAGS

"For meritorious services on the production front" during the past 6 months, the War Department has just awarded to Byron Jackson Co. the star to be added to the two Army-Navy Production Award "E" flags presented to this concern in August 1942. The two Los Angeles, Calif., plants, which previously produced oil-well tools and centrifugal pumps, were recognized separately with a dual flag presentation last year, the first of its kind for war production.



E. S. Dulin, president, Mrs. Hassie Ramey and William Powell proudly display flags with "stars" awarded for continued production achievement

THE GEOTECHNICAL CORPORATION

ROLAND F. BEERS
President

1702 Tower Petroleum Building

Dallas, Texas

Telephone L D 711

Research Laboratory
Lincoln, Massachusetts

DeGOLYER and MacNAUGHTON

PETROLEUM GEOLOGISTS
and
APPRAISERS OF OIL COMPANIES
AND PROPERTIES

1000 CONTINENTAL BUILDING
DALLAS, TEXAS

E. DeGOLYER WILLIS G. MEYER
LEWIS W. MacNAUGHTON

Among Equipment Men

Emsco Appoints New Officers

Emsco Derrick & Equipment Co. announces the appointment of W. C. Kinder and C. L. Lamkin as vice

C. L. LAMKIN

W. C. KINDER

presidents of that company effective March 1, 1943.

Mr. Kinder entered the Emsco organization in June 1939 as California manager of sales of the D. & B. Division. In January 1941 he became assistant to the president, and on March 1, 1943, was promoted to vice president.

Mr. Lamkin entered Emsco's employ in April 1928 in the sales department. On January 1, 1940, he was transferred to Texas as manager of Emsco's Houston plant. On March 1, 1943, he became a vice president of the company.

Harris With Smith Meter

Winston Harris has joined Smith Meter Co., 5743 Smithway St., Los Angeles, Calif., to take the place of G. O. Tate, who died recently. Mr. Harris will be headquartered at 726 North Main Street, Wichita, Kans. He will cover the states of Nebraska, Kansas, Oklahoma, Missouri and Arkansas. Mr. Harris goes to his new post from the Westcott & Greis organization, Tulsa, Smith Meter Co. dealers.

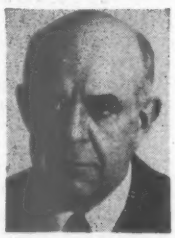
Rickenbacker Greets Friends At Marmon-Herrington

It was "old home" day when Eddie Rickenbacker recently visited Marmon-Herrington Co., at Indianapolis, Ind., and found a large group of his old Speedway "buddies" at work there.

Greeting "Rick" at the plant were Col. A. W. Herrington, chairman of the board of directors of Marmon-Herrington and chairman of the technical committee of the Speedway; Bert Dingley, national A.A.A. racing champion in 1909, now president of Marmon-Herrington; Seth Klein, official starter of Speedway races and a Marmon-Herrington vice president; "Snappy" Ford, chief timer of Speedway races; George Freers and S. E. Rowe, members of the A.A.A. technical committee; Nick Meo, an official observer at the races; Bill Endicott, a driver in the first 500-mile race, and Ora Haibe, who drove in several Speedway races.

Also, at Merz Engineering Co. he found Charlie Merz, president of the Merz company and official representative of the A.A.A. contest board for Indiana; Lee Oldfield, assistant chairman of the Speedway technical committee; Earl J. Breech, Merz treasurer and a director of the Speedway, and Tommy Thompson, a member of the Speedway technical committee.

Athey Promotes Ben Lease



Ben. F. Lease, formerly manager of service and research, has been made domestic sales manager of Athey Truss Wheel Co., Chicago, Ill. Mr. Lease started with Athey in 1931 as district representative. In a short time he was made special representative, and then was given the position to direct service and research. From 1917 until he joined the Athey staff, he was associated with the Republic Truck Co., part of which time was devoted to sales efforts for an affiliated concern, the Linn Manufacturing Co., with his headquarters in Minneapolis, Minn. Mr. Lease has been closely connected with the design and development of the Athey Mobiloader. With sales and service through Athey Caterpillar dealers, this company manufactures forged trak-trailers, logging cruiser wheels, in addition to Mobiloaders and force-feed loaders, a new product announced shortly prior to the beginning of the war.

Gilmer Makes Appointment

L. H. Gilmer Co., belting manufacturers of Tacony, Philadelphia, Pa., have made a new territorial appointment. Joseph C. Jennings becomes technical field manager for Texas and in charge of the Houston branch. Mr. Jennings, a graduate mechanical engineer, comes from the Gilmer factory in Philadelphia, where for nearly a year he had been connected with the industrial service department. Previous to coming with the Gilmer company he had for a number of years been in charge of the mill supply division of a distributor of Gilmer products.

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED RATE

8 CENTS A WORD, minimum charge $2 per insertion.

SITUATIONS WANTED, 4 cents a word, minimum charge $1.

BOX NUMBERS, count 9 words when replies are to be sent to our Tulsa Office.

10% DISCOUNT if 3 insertions are ordered at one time, with check accompanying order.

All classified advertising payable in advance.

DISPLAYED—PER INCH

Classified display advertising set in single or double column style:

1 inch	1 time	$7.00
1 inch	13 times	6.50
1 inch	26 times	6.00
1 inch	39 times	5.50
1 inch	52 times	5.00

Rates are governed by total space used within 12 months from date of first insertion. Credits are allowed when lower rates are earned.

FORMS CLOSE MONDAY NOON—PUBLISHED EACH THURSDAY

REAL ESTATE

WINNFIELD, LA.

Center of North Central Louisiana oil activity, invites oil men and oil concerns to make their homes and headquarters at Winnfield.

TOWN OF WINNFIELD
City Hall — Winnfield, La.

HELP WANTED

PROCESS ENGINEERS

Graduate Chemical Engineers and Chemists. Prefer men with experience in refinery or gasoline plant on design or operation of light end equipment. Location, Mid-West. Permanent position. In reply state experience, education, age, draft status and salary expected. Box B-510, The Oil and Gas Journal, Tulsa, Okla.

WANTED—EXPERIENCED Engineers and designers for internationally known manufacturers of oil field drilling and servicing equipment, now working on war contracts. Permanent—full time—pleasant work. Salary discussed in personal interview. Cardwell Manufacturing Co., Box 2001, Wichita, Kansas.

PETROLEUM AND MECHANICAL Engineers wanted by well established oil producing equipment manufacturer for technical work in product development. Good opportunities for personal development in management, field engineering and sales. Good future for right man. Give age, previous experience, salary requirements, draft status. Replies strictly confidential. Box B-550, The Oil and Gas Journal, Tulsa, Okla

INSTRUMENT Maintenance Men wanted. Preferably with oil refinery experience. Acquainted with Foxboro, L & N, Taylor, and Mason-Nielan instruments and controls. For new plant being built, location Texas Gulf Coast. Send photograph and complete experience record. Men now employed in war industries not considered. Box B-561, The Oil and Gas Journal, Tulsa, Okla.

NOTICE TO ADVERTISERS

Advertisers offering positions to workers skilled in critical war industries are requested by the War Manpower Commission to include the following sentence in their advertisement:

"Applications from those now employed in war industries will not be considered."

HELP WANTED

CHEMIST with bachelor or master degree from accredited colleges for work with major oil company refinery near Houston. Will be engaged in essential war activities. Good opportunity for qualified man. No experience required. Send details concerning training, personal history, and small photo to P.O. Box 2527, Houston, Texas.

WANTED: Chemist with 2 or more years laboratory experience. Permanent position. State draft status, education, salary required. Apply to Box B-563, The Oil and Gas Journal, Tulsa, Okla.

SITUATIONS WANTED

EXECUTIVE ENGINEER, age 38, 20 years active experience sound organizations, refining and heavy chemical field. Well versed equipment, processes, engineering, estimating and construction. Desires contact management where this experience can be used. Box B-513, The Oil and Gas Journal, Tulsa, Okla.

WANT POSITION AS DRILLING SUPERINTENDENT or Assistant Drilling Superintendent: 30 years' experience as driller and drilling superintendent. Thoroughly know the drilling, production and work-over business and can prove it, both by first class references from former employers and by action on the job. Age 45, married and at present employed but not at my highest skill. 1805 Elmen Street, Houston, Texas.

PETROLEUM ENGINEER, age 43, thirteen years experience Research, Process, Design. M.S. degree Chemical Engineering. Desire contact management interested in these qualifications. Box B-564, The Oil and Gas Journal, Tulsa, Okla.

PRODUCTION GEOLOGIST: 19 years experience Mid-Continent, Illinois and Michigan Basins, including subsurface geology, rotary and cable tool drilling, all phases of production. 38 years old, married, one child, 3-B draft classification. Box B-562, The Oil and Gas Journal, Tulsa, Okla.

GEOLOGIST with 25 years experience in petroleum. Can give best references. For work in Mid-Continent. Box B-560, The Oil and Gas Journal, Tulsa, Okla.

REFINERY ACCOUNTANT, plant storekeeper, good record as secretary, age 40, Protestant, ambitious, wishes change for betterment where high standards of personal conduct, loyalty, sincerity, tact and industry are required. Box B-566, The Oil and Gas Journal, Tulsa, Okla.

LEASES AND DRILLING BLOCKS

LEASES ROYALTIES

PRODUCING OR NONPRODUCING

Texas, New Mexico, Oklahoma.

Louisiana and Illinois.

20 Years' Experience

Inquiries Invited

B. D. BUCKLEY

80 Broadview Drive, Clayton
St. Louis, Mo.

NEW MEXICO
State Oil and Gas Leases

Forty acres and multiples thereof, in a new HoT spot. 23 oil companies own surrounding leases. Write for information. No obligation. HARRY S. WRIGHT, New Mexico State Lessee, Farmington, N. M.

WHY NOT FILE for government oil lease on U. S. oil reservation lands, under new law? It's opportunity. Box B-522, The Oil and Gas Journal, Tulsa, Okla.

WANTED TO PURCHASE developed producing oil properties in Kansas or West Texas. Prompt action. C. C. Harmon, Nowata, Okla.

WANT LARGE WILDCAT DRILLING BLOCKS. Texas, Louisiana, Arkansas, Oklahoma, New Mexico, Illinois; state proposition; location in detail, first letter. ATS, 1216 Ford Bldg., Detroit, Mich.

FOR SALE: Oil property and country estate located in Venango Co., Pa. 430 acres of land, timber, some coal, 21 bbls. of oil daily, no pressure used. 106 oil wells, 7 powers. Complete set of buildings for oil and farm use. Owners home furnished with antiques, etc. Address Owner, 10 West Third St., Oil City, Pa.

5000 ACRE STRUCTURE fully geologized, geophysical, cored, equipped rotary and cable. Contractor drafted. Want deal completion. S. W. Pressey, Pueblo, Colo.

PATENT ATTORNEYS

PATENTS, Trade-Marks. Booklet, "General Information Concerning Inventions and Patents" and "Free Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 418, Bowen Bldg., Washington, D. C.

EQUIPMENT WANTED

WANTED: Well servicing units in good condition. All makes and sizes considered. We pay cash. Melton Supply Co., Seminole, Okla.

WANTED: Truck load quantities, or more, of used small pipe, black and galvanized, ½", ¾", 1", 1¼" and 1½", shopped or unshopped. Advise price and location. CENTRAL PIPE & SUPPLY CO., 2611 Avenue H, Lubbock, Texas.

WANTED: Lufkin 41 B Pumping Unit or comparable double reduction unit. Temple Petroleum Co., 212 Hightower Bldg., Oklahoma City, Okla.

REFINERIES as a whole or in part. Tanks, High Pressure—Atmospheric and Crude Oil Storage, Horizontal or vertical—Boilers—Stills—Bubble Towers—Fractionating Towers—Condensers—Heat Exchangers—Valves—Casings—Line Pipe—Boiler Tubes—Diesel Engines—Bulldozers—Turbines—Draglines—Shovels or what have you for sale? Send Complete Information, price and description. FALLS CITY SALES CO., Phone: Jackson 0189, Box 776, Louisville, Ky.

WANTED

Abandoned Pipe Lines, in or out of the ground, Oil Wells, Steel Buildings and Steel Storage Tanks of all sizes.

JOS. GREENSPON'S SON PIPE CORP.

National Stock Yards, St. Clair Co., Illinois.

(Continued on Next Page)

CLASSIFIED ADVERTISING — EQUIPMENT FOR SALE

STORAGE TANKS—PRESSURE VESSELS

1000 Bbl. to 8000 Bbl. storage tanks offered cut down, matched marked, and re-erected on your grounds. Large stock of horizontal storage tanks and pressure vessels available for immediate delivery. Wire, phone or write for quotations.

SONKEN-GALAMBA SUPPLY COMPANY

W. C. Berry — Union Ave. at 21st Street

Robt. W. Duden — Tulsa, Oklahoma

FOR SALE—One partial list steam rotary equipment located near Coyle, Oklahoma, priced right to sell. Inquire T. T. Eason and Company, Enid, Okla.

COMPRESSORS—TANKS—FOR SALE

2—Bessemer type 8, direct driven engine and compressors, 80 hp., 180 r.p.m. Engine cylinder 16 x 20 and air cylinder 7 x 20. 2—Bessemer compressors same as above with air cylinder 14 x 20. 3—8,000 gallon capacity steel gasoline storage tanks, size 10'x13'x¼", riveted. Louisiana Iron & Supply Co., Longview, Texas.

1-#2 NATIONAL DRILLING Machine, wooden mast. Call or write E. M. Howard, Rising Star, Texas.

PUMP PARTS for Worthington, National Transit, Gardner-Denver steam pumps. Iverson Tool Company, Tulsa, Oklahoma, Phone 4-9127.

FOR SALE: 1 Rotary Drilling Outfit—Diesel Electric complete with drill pipe capable drilling 8500'. Atlas Imperial 200 HP Engines Allis-Chalmers Generators and motors for both pump and hoist. Power equipment with or without motors saleable as a unit. Rig now drilling near Texarkana, Arkansas. LUCEY PRODUCTS CORP., Tulsa, Okla.

FOR SALE: 8000' or any part, Used 3-Conductor Electric Cable good condition for any service 1000 Volt or less. Price 25c to 45c per ft. Free sample on request. General Tool & Supply Co., Box 4387, Oklahoma City, Okla.

FOR SALE: 100,000' of 5" line pipe T&C—genuine wrought iron pipe. 24,000' of 5" plain end seamless, Pipe is standard line pipe—weight 14.62#. Ceiling price. Pipe has been straightened and cleaned—ready for immediate use. Located near Bethlehem, Pennsylvania. For particular details contact The Producers Supply & Tool Co., Fort Worth, Texas, or the Interstate Pipe & Supply Co., Marietta, Ohio.

6—BESSEMER 25 HP Gas Engines, complete with Spur Gear Clutches, now in operation, CHEAP. A. A. Gilbert Pipe & Supply Co., Shreveport, La.

Second hand Oklahoma City alloyed sucker rods, ¾", ⅞" and 1". Sucker Rods, Fishing Tools, Tubing Spiders, Tubing Catchers, all sizes. Structural Steel and Reinforcing Rods.

M. R. TRAVIS.
1702 S. Boulder — Tulsa, Oklahoma

DIESEL—GAS—ENGINES

Large selection — All sizes and types. Generator units, marine engines, gasoline engines, auxiliaries—boilers, steam engines, and turbo-generator sets.

Complete information on request.

A. G. SCHOONMAKER COMPANY
48 Church Street, New York, N. Y.

FOR SALE: At Hobbs, New Mexico—2—65 HP, 1—85 HP. LFB Boilers. Cities Service Oil, Patridge, Bartlesville, Okla.

25,000' of 2½" Plain end line pipe, strictly #1 grade, 16c per foot. A. A. GILBERT PIPE & SUPPLY CO., P.O. Box 986, Shreveport, La.

MODEL F-37 Fort Worth Spudder for Sale: Has drilled only 2000' of hole. Complete, with belts, drilling lines, Spang jars, sockets, stems, 6" to 15" bits, circle and jack, tool wrenches, etc. Ready to use. For complete information and price, write: Wiegand Brothers Drilling Co., 1509 Milam Bldg., San Antonio, Texas.

2—120 HP, 650 RPM, rebuilt Diesel engines, power units.
6—200 HP, 514 RPM, completely rebuilt Diesel engines, power unit.
The above can be supplied with Generators if desired.
4—275 HP, 514 RPM, completely rebuilt Diesel engine power units.
1—80 HP, 650 RPM completely rebuilt Diesel engine.
3—45 HP, 950 RPM, New Atlas Imperial gas engines.
1—75 HP Variable speed A.C. Motor.
1—5 HP New Diesel engine.
1—L.R.O. Waukesha power unit.
2—66 HP Boilers.
2—Big Diesel Full Electric Direct Current Drilling Rigs.
1—Medium size Diesel Full Electric Direct Current Drilling Rig.
Also variable sizes small alternating current motors.

K. S. RICHARDS
P.O. Box 443 — Fort Worth, Texas
Phone 3-5600

FOR SALE one Sullivan CN Hydraulic and Hoist Unit for core or shot hole drill. Cities Service Oil Company, Bartlesville, Okla.

BARGAIN: Hope Reeves — 60 HP 300 R.P.M. Vertical direct driven Compressor Engine. Steel House. No priorities. $850. A. Brown, Haskell, Okla.

4—10,000 Gal. Boardmen Horizontal Gasoline Tanks. Piedmont Mercantile Co., Piedmont, Okla.

DRESSER COUPLINGS

For Sale

Immediate Shipment

125—20" Dresser Couplings complete with Rubber Rings and Bolts, perfect condition.

50—30" Dresser Couplings complete with Rubber Rings and Bolts, perfect condition.

BROWN-STRAUSS CORP.
Box 78, Kansas City, Mo.

FOR SALE—Approx. 6000 ft. 6⅝" OD 25.20# drill pipe with Reed Full Hole Shrink Grip Tool Joints, A-1 condition. Inquire T. T. Eason and Company, Enid, Okla.

FOR SALE at Seminole, Oklahoma, two steel pumping beams $100.00 each. Cities Service Oil Company, Bartlesville, Okla.

FOR SALE: Buda Diesel Engine, 4 cylinder, vertical, 850 R.P.M. with starting engine, on skids, good condition. Price $500.00. General Tool & Supply Co., Box 4387, Oklahoma City, Okla.

---

200 HP FAIRBANKS MORSE-175 KVA light plant—2300 volt—100 HP 75 KVA 2300 volt. OIL CASING blocks, RD7 Bulldozer, 50 Diesel-Caterpillar bulldozer-G6 Scraper. Steam high pressure pumps—1¼ yard Thew Lorine Shovel—5 Kohler 5KW light plants—77 Austin Western Tandem Patrol—1½ and 2 yard clamshell buckets—1½ Page dragline — ½ yard BUCKEYE DRAGLINE — Byers trench hoe—RD7 complete with side boom winch 60 ft. boom. Send us your inquiries, we can furnish your wants in machinery line. MACHINERY SALES COMPANY, 1718 Walnut, Kansas City, Mo., day VICTOR 2731; night WESTPORT 4070.

MODEL K-TYPE Star Spudder with Allis-Chalmers power unit. Almost new. Model 45 Heavy Duty Star Spudder with power unit. Sell either with or without tools. Box 378, Cherryvale, Kansas.

FOR SALE: 100 HP, 250 pound working pressure, Lucey Boiler, code condition. Melton Supply Co., Seminole, Oklahoma.

BANKRUPTCY SALE: Houston Portable Rig, Model 876; Waukesha Motors and light plants; two Wilson-Snyder pumps. Fort Worth Super J Special Spudder, D-13,000 Caterpillar Diesel Engine; two Kohler Light Plants. Cardwell Double Drum Unit Rotary and Cable Rig, Model R-154; Caterpillar Diesel Motor. Large stock tools, fittings, miscellaneous drilling equipment, etc. Several thousand feet of 3½", 4½" and 6⅝" drill pipe. For information write Burton B. Paddock, Trustee, First National Bank Bldg., Fort Worth, Texas.

1000—6" Style 38 Reconditioned Dresser Couplings with new Armored Gaskets. Utility and Industrial Supply Co., Jackson, Michigan.

FOR SALE: 2—200 HP Atlas Imperial Diesel Motors; 1—Allis-Chalmers Generator, DC, Serial #130589, Volts full load 350, Amps 714, 1200 RPM; 1—Allis-Chalmers DC Generator and Exciter, Shunt wound type EB 120, 15 KW, 24 hrs., WDGS, 50° C. Com. 68° C., 800-1200 RPM, 120 Amps, Volt Load 125, Serial No. 3147 CK-120-DEB-1-1; 1—Allis-Chalmers Electric Motor, DC, Serial No. 130588, 300 HP, 225 to 350 Volts, Amps 669, 1 hr. 520, 1000 RPM; 1—Allis-Chalmers DC Motor & Exciter Compound wound type, 1¼ HP 24 hrs., WDGS, 50° C., Com. 55° C., 1800 RPM, 125 Volts, 10 Amps, Serial #9170-MK-51DE-3; All switch boxes and wiring included; 1—7¼ x 18 Wilson-Snyder mud hog pump. All above equipment in use at present time. JENKINS SUPPLY, Box 1241, Seminole, Okla., Phone 1088.

GASOLINE PLANT EQUIPMENT FOR SALE

1—10,000 Bbl. Graver Spheroid Gasoline Storage Tank.
2—75 HP Erie City Iron Works Return Tube Boilers.
1—45 HP 125# W.P. F&T Oil Field Type Boiler.
4—10" Griscom-Russell Bent Tube Oil Coils.
2—Braun 144" Open Type Oil Coolers.
1—4' x 14'4" Type Deph Tulsa Boiler Dephlegmator.
1—Southwestern 240-120-B Condenser.
Also miscellaneous pumps, steel tanks, steel buildings, control panel equipment.

MAGNA MATERIAL COMPANY
P.O. Box 1814 — Tulsa, Okla.
Phones: Local 2-1188. L.D. 501

Classified Advertising

EQUIPMENT FOR SALE

FOR SALE — One complete steam rotary outfit less boilers, located near Coyle, Oklahoma, priced to sell. Inquire T. T. Eason and Company, Enid, Okla.

WAR
WHAT IT TAKES TO WIN
MANPOWER AND EQUIPMENT

The following critical materials being offered for sale and immediate delivery:
18 STEEL BUILDINGS, CONSISTING OF 250,000 SQ. FT. OF AREA, LOCATED AT
EGYPT, PA.
EASTON, PA.
NORTHAMPTON, PA.
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MANY EQUIPPED WITH CRANE RUNWAYS FOR HEAVY DUTY
37 LARGE OIL STORAGE TANKS UP TO 35,000 BARREL CAPACITY, LOCATED IN NORTHERN OHIO.
Are in Position to Dismantle, Match-Mark and Load Buildings or Tanks
3200 TONS OF STRUCTURAL STEEL, MISC. LENGTHS. PRIME CONDITION, AVAILABLE FOR IMMEDIATE DELIVERY. LOCATED IN CENTRAL OHIO.
HAVE AVAILABLE IN PHILADELPHIA, PA., 1500 TONS OF STRUCTURAL STEEL, ALL SIZES AND SHAPES, INCLUDING TRUSSES AND GIRDERS.
For Information and Immediate Action
PHONE, WRITE or WIRE
PLANT & EQUIPMENT PURCHASING CO.
Fountain Square Bldg., Cincinnati, Ohio
Phone Main 2142
or
BUYERS SERVICE & ENGINEERING CO.
P.O. Box 552, West Tulsa, Oklahoma
Phone 2-4441

FOR SALE: One 145 HP. WOKG Waukesha Cable Tool Drilling Engine Unit complete; mounted on iron skids. Has had very little use; excellent condition. Western American Oil Company, Bartlesville, Oklahoma; phone 989.

FOR SALE: Lufkin pumping unit suitable for 4000' well. Melton Supply Co. Seminole, Okla.

162—3½" OD—6½" Centers—Chrome Key Headers
30—Pieces 3½" ID—4" OD—21' to 28' Long—Chrome Tubes
120—Pieces 3" ID—3½" OD—30' Long—Chrome Tubes
1—½" Shell 5'x74'—4000 barrel cap. Crude Oil Fractionator with Trays
30—Pumps, various sizes and types

A. C. BARTSCH
BOX 127 FOREST PARK, ILL.

FOR SALE:

300—13" OD, 8 thread, new casing couplings

1—Gasoline Power Drilling Rig good for 3000'.

Also Steam Drilling Rigs and pipe and casing of all sizes.

We also purchase abandoned Leases, Refineries, pipe lines and other oil field equipment.

If in need of material or have material for sale, communicate with

Louisiana Iron & Supply Co.
Shreveport Louisiana
Phone 5223 or L.D. 1

EQUIPMENT FOR SALE

PUMPING UNITS FOR SALE: 3 Ideco DT-123 Standard Twin Wheel cranks with International Harvester U-10 35 hp. engines. New Condition. B. H. Hilburn, Gulf States Bldg., Dallas, Texas.

FOR SALE—Bessemer Gas Engines, Compressors and repair parts. Vessels, towers, pumps, Chaplin Fulton regulators, Fisher liquid level controls, vacuum, pressure & temperature recorders, meters, valves, fittings, pipe and other miscellaneous material. GILBERT PIPE & SUPPLY, Electra, Texas.

500 tons of cable tools at a big saving. You can pick what you want.

DEEGEN PIPE & SUPPLY CO.
401 No. Boston
Phone 3-2329 Res. 6-4726
Tulsa, Okla.

FOR SALE

One steam drilling rig complete with 4 and 6 inch drilling pipe. Ready to move on location. This rig is practically brand new. Capable of drilling 12,000 ft. A bargain.

One steam drilling rig complete with 4 and 6 inch drilling pipe. Ready to move on location. Good condition. Bargain.

Also 9,000 ft. 2½ inch and 2,000 ft. 2 inch line pipe.

Complete inventory will be furnished upon request.

FRANK & FRED JONES DRILLING COMPANY
1506 Tower Petroleum Building
Dallas, Texas Phone R-1585

BUSINESS OPPORTUNITIES

BUSINESS OPPORTUNITY: Are dismantling complete oil refinery to obtain certain vital materials. The surplus equipment could be easily converted to the processing of asphalt and greases. Location in the heart of several Army Camps. If you know asphalt operation and are in position to finance do it now. We will assist any responsible party with terms to suit requirements. 90% of the equipment is installed and ready plus a good warehouse, office, etc. Address P.O. Box 1421, or Phone 2-1740, Alexandria, La.

FINANCING

CAPITAL SEEKERS—Interested in raising $25,000 or more for a legitimate project should write to AMSTER LEONARD, Fox Theater Bldg., Detroit, Mich.

WORKING CAPITAL AVAILABLE

Large independent marketer handling government contracts desires connection with refinery producing fuel oil, kerosene and gasoline. Prepared to invest substantial working capital or will consider outright purchase of refinery. All replies confidential. Write or wire Box B-565, The Oil and Gas Journal, Tulsa, Okla.

LEGAL BLANKS

OIL FIELD LEGAL BLANKS
Leases, assignments, releases, township plat books, well records, etc. Request on your letterhead gets free catalog. Olds Press, 215 East Third St., Tulsa, Okla.

INCORPORATION

DELAWARE CHARTERS: Powers broad, taxes low. Many of the largest corporations have Delaware charters. Complete service $35. Submitted forms. Chas. G. Guyer, Inc., Wilmington, Delaware.

Germans Expect Rise in Estonian Shale-Oil Yield

The Nazis hope to produce 182,000 metric tons of shale oil in Estonia in 1943, say British trade reports. Production would thus reach the same level as in 1939. The Sillamagi plants near Narva, destroyed by the U.S.S.R. forces before they retreated, are said to have been rebuilt by the Nazis.

Crude-Oil Prices

(Continued from Page 129)

Gulf Refining Co.:
Illinois basin, 5-21-41 ..... $1.37

Michigan

Simrall Corp., 5-27-41:
Greendale, Porter, Vernon, Crystal, and Wise $1.44
Buckeye, Bentley, Edenville, Beaverton, and Monitor (sweet) 1.43
Freeman, Redding, Lincoln and Winterfield 1.39
Hamilton-Grout 1.39
West Branch-Arenac 1.34
Sohio Corp., 5-1-41:
Bloomingdale-Columbia $1.45
Mid-West Refineries, Inc., 5-1-41:
Kent County $1.38
Pure Oil Co., 5-27-41:
Sherman $1.39
Midland (Midland County) 1.44

ROCKY MOUNTAIN GRAVITY TABLE

Below 29	$0.96
29-29.9	.98
30-30.9	1.00
31-31.9	1.02
32-32.9	1.04
33-33.9	1.06
34-34.9	1.08
35-35.9	1.10
36-36.9	1.12
37-37.9	1.14
38-38.9	1.16
39-39.9	1.18
40 and above	1.20

Stanolind Oil & Gas Co., 5-20-41, includes Dutton Creek, Midway, and Salt Creek except Tensleep crude, Wyoming.
Sinclair-Wyoming Oil Co., 5-20-41, includes Salt Creek and Lost Soldier, except Tensleep crude, Wyoming.
Continental Oil Co., 5-21-41, includes Fort Collins and Wellington, Colorado.

Wyoming

Ohio Oil Co.:
Rock River (5-20-41) $1.10
Lance Creek (7-1-41) 1.12
Elk Basin and Grass Creek (light) .. 1.00
Elk Basin (heavy) (3-9-43) ..... .82
Grass Creek (heavy) (4-1-43) ..... .85
Stanolind Oil & Gas Co.:
Frannie (light) (4-1-43) $0.85
Frannie (heavy) (4-1-43) ..... .62
Grass Creek (light) (5-20-41) 1.00
Grass Creek (heavy) (4-1-43) ..... .65
Hamilton dome (2-26-43) ..... .60
Elk basin (5-20-41) 1.00
Salt Creek (Tensleep) (4-1-43) ..... .8285
Continental Oil Co.:
Big Muddy (5-30-41) $1.08
Lance Creek (9-1-41) 1.12

Montana

Continental Oil Co., 4-1-41:
Cat Creek $1.15

Colorado

Stanolind Oil & Gas Co., 5-20-41:
Iles $1.07
Continental Oil Co., 5-21-41:
Canon City-Florence $1.05

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Journalisms:

WHEN we published most of the text of Petroleum Administrative Order 11 last week, probably the majority of our readers merely considered it a part of our usual service of acquainting them with latest developments in Washington. Some company executives, however, checking through their organizations several days later, found that the Journal was their only source of information on the subject for some time. Officials of one company reported stopping drilling on two wells which had been incorrectly located immediately on reading their Journal when, had they waited until the order came in in the normal course of events, they would have added several hundred dollars to their costs. To them the service was far from routine.

ACTUALLY, it was no simple matter to publish this order. It was released to our Washington editor after the forms had been closed. He wired the order in to Tulsa where it was set and placed in the forms on the presses which were considerably delayed as a result. By speeding up the press run, however, we were able to meet our mail schedules with nobody the wiser. It was a scoop which performed a service much more useful than the usual journalistic scoop which is noticed, in the main, only by other journalists.

HERNDON E. DAVID, a member of The Journal's exploration and drilling staff, is the latest editorial representative to join the armed forces. Herndon was called to active service the first of the week in the aviation corp. He joined the staff in 1940 on a part-time basis while a student in the petroleum engineering school of the University of Tulsa. He completed his university course last year and has been doing full-time work while awaiting his call from the aviation reserve. Herndon will not be a novice when he starts flying for the Army. Despite his numerous duties over the past 3 years he completed a course in civilian flying and has some 2,000 hours in the air to his credit.

THE departure of Herndon David brought the veteran of The Journal's editorial staff and the dean of all oil writers back into active service. James McIntyre, for many years our editor and later consulting editor, has rejoined the Tulsa staff. Mr. McIntyre became a member of The Journal organization in 1917 after serving for several years as managing editor of a Bradford, Pa., newspaper. He retired from active service in July 1940.

CALENDAR

April

AMERICAN CHEMICAL SOCIETY 105th annual meeting, Detroit, Mich., April 12-16.

NATURAL GASOLINE ASSOCIATION OF AMERICA, twenty-second annual meeting, Baker Hotel, Dallas, Tex., April 14-16.

NATIONAL PETROLEUM ASSOCIATION, semiannual meeting, Cleveland Hotel, Cleveland, Ohio, April 15-16.

NATURAL GAS MANAGEMENT CONFERENCE, under auspices of Natural Gas Section, American Gas Association, Gibson Hotel, Cincinnati, Ohio, April 28.

AMERICAN PETROLEUM INSTITUTE, DIVISION OF PRODUCTION, Southwestern District, Rice Hotel, Houston, Tex., April 29-30.